

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



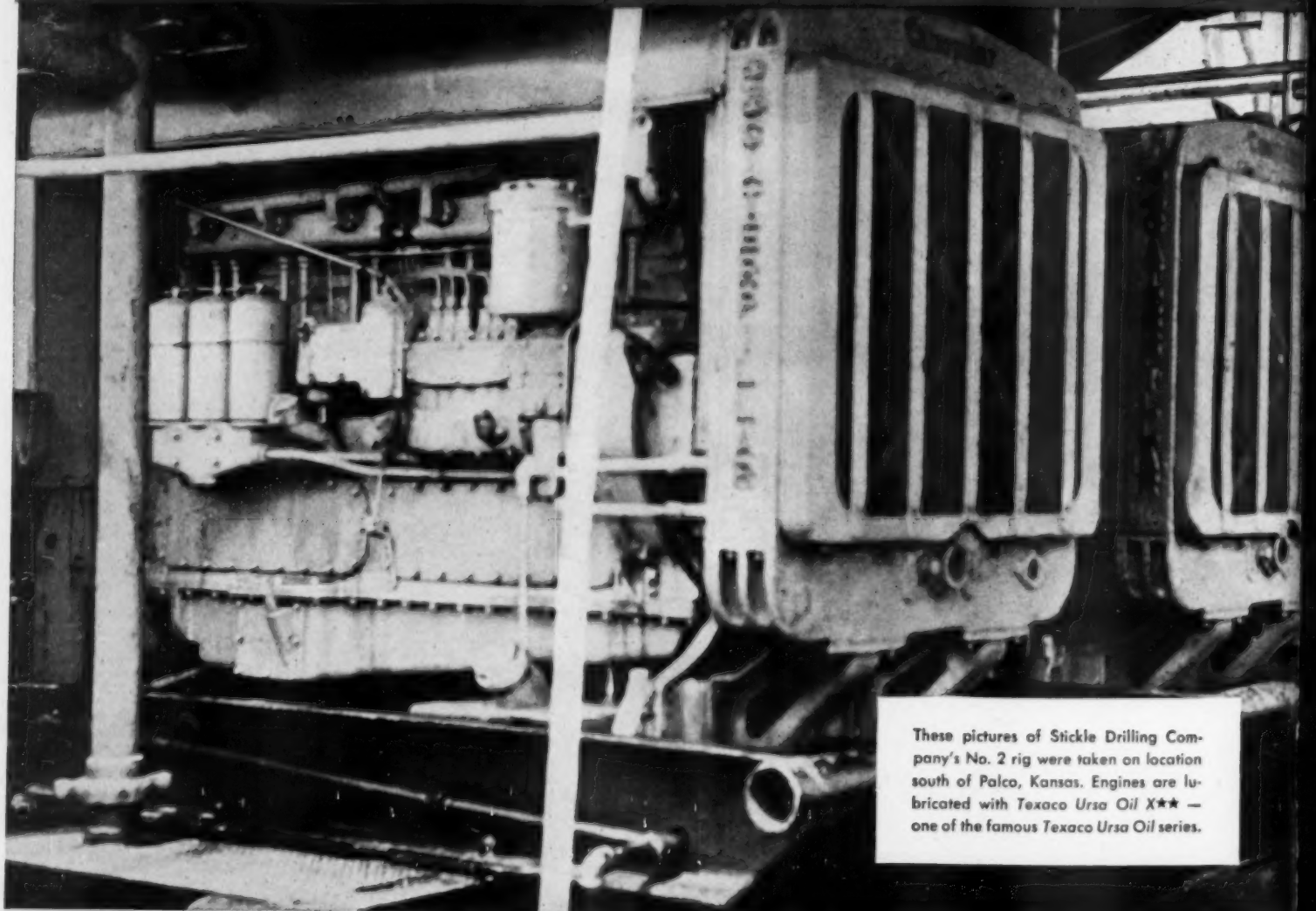
FIVE DOLLARS PER YEAR

SEPTEMBER, 1953

FIFTY CENTS PER COPY

28,540 HOURS' ...WEAR LESS

Stickle Drilling Company's
lubricated with TEXACO



These pictures of Stickle Drilling Company's No. 2 rig were taken on location south of Palco, Kansas. Engines are lubricated with Texaco Ursa Oil X★★ — one of the famous Texaco Ursa Oil series.



TEXACO

OPERATION THAN .001"

Diesels are
URSA OIL—



Stickler Drilling Company, Tulsa, Oklahoma, has long been getting outstanding performance from Diesels lubricated with *Texaco Ursa Oil*. Typical are the three Caterpillar Diesels operating the No. 2 drilling rig. These were taken down for inspection after 28,540 hours of operation, and the following report gives the story:

"We found that *Texaco Ursa Oil* had kept these engines ideally clean. Measured wear was under one-thousandth of an inch. Since then, the engines have been back in operation for over 10,000 additional hours without any down time."

You can get similar fine performance by using the recommended member of the famous *Texaco Ursa Oil* series — a complete line of lubricating oils for Diesel, gas and dual-fuel engines. Whatever the type, size or speed of your engines, their operating conditions or fuel used, there is a *Texaco Ursa Oil* to assure clean, efficient performance with minimum maintenance costs and fuel consumption. The *Texaco Ursa Oil* series is approved by leading engine builders and preferred by operators everywhere.

A Texaco Lubrication Engineer will gladly give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

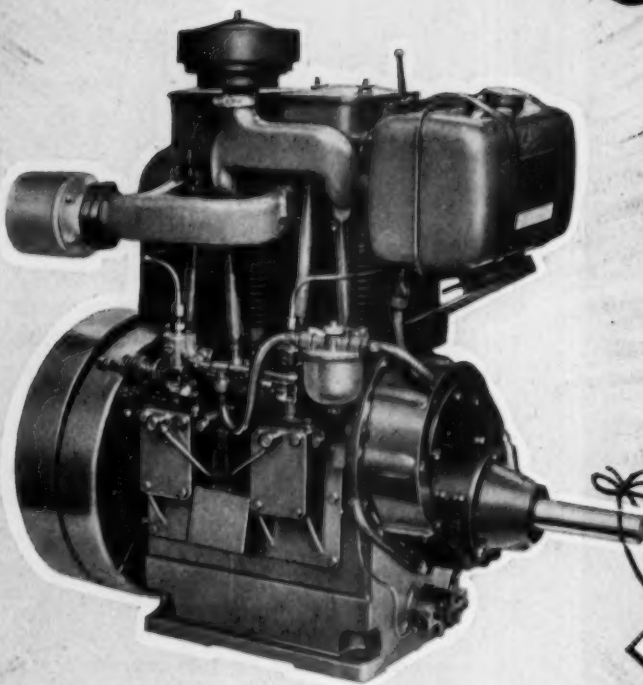
URSA OILS

FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES



Diesel Engines

AIR-COOLED
WATER-COOLED
3 H.P. TO 40 H.P.



LOW COST

BACKED BY A WORLD-WIDE
PARTS AND SERVICE ORGANISATION
FOR THE 350,000 ENGINES IN USE

- MARINE AUXILIARIES
- GENERATORS
- PUMPING EQUIPMENT
- COMPRESSORS
- REFRIGERATION
- OIL FIELD EQUIPMENT
- MINING EQUIPMENT
- AGRICULTURE MACHINERY

WRITE FOR INFORMATION

A FEW CHOICE DISTRIBUTORSHIPS OPEN

PETTER

ENGINE DIVISION OF BRUSH ABOE INC.

Office and Showroom 40-47 39th AVE. WOODSIDE, NEW YORK

diesel power has waited years for...

Alumibond*

THE UNITY OF OPPOSITES...

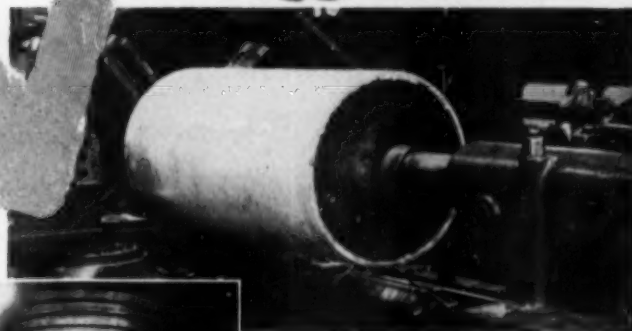
CAST IRON MIGHT... ALUMINUM LIGHT

*A process that integrally joins aluminum and ferrous metals by a molecular bond.

Alumibond brings diesel power engineering a great material change. For the first time aluminum can be molecularly bonded to a cast iron or steel piston skirt, uniting the best qualities of both metals for unmatched performance... completely eliminating the problem of piston seizures. Alumibond permits the production and design engineer to control all inherent piston problems, providing a combination of the strength, resilience and fatigue resistance of ferrous units, with the heat transfer, bearing qualities, and corrosion resistant properties of aluminum. Here is a new tool to work with—ALUMIBOND—greatly reducing maintenance costs and achieving a new high in operating efficiency.

If you operate a Diesel Plant...
We can bond a heavy aluminum bearing surface to the full length of your piston skirts by the Alumibond process... gives you far greater efficiency and maintenance economy.

If you manufacture original Diesel Equipment...
We can prepare your aluminum clad pistons in our foundry through the Alumibond process... giving your products far greater lasting power and built-in smoother operation.



Above—Cast iron piston skirt used in large 2-cycle diesel engine with Aluminum bonded to bearing surfaces by ALUMIBOND process. Since Aluminum has excellent bearing qualities, the entire skirt is virtually one large bearing.



Left — Alumibonded piston after one year's service. Scratches indicate where hard particles worked down the skirt with no serious damage to piston and none to liner... because of aluminum's imbedability characteristic.



GET THE WHOLE STORY!

Write For The
ALUMIBOND Booklet
TODAY!



ARTHUR TICKLE ENGINEERING WORKS

34 Delevan Street, Brooklyn 31, N. Y. Telephone: MAin 5-4200

NOW...

A NEW, MORE POWERFUL GENERAL MOTORS DIESEL THE **TWIN 6-110!**

- ★ Substantially lower cost
- ★ More power from less space and weight
- ★ Torque converter equipped for oil field use

HERE'S General Motors' newest oil field Diesel engine—the power-packed 2-cycle Twin 6-110.

It is 50% more powerful than the famous GM Twin 6-71 that powers more drilling rigs than any other Diesel—yet it has outstanding compactness and light weight. It fits existing compounding case centers.

The new Twin 6-110 gives drillers a wide range of power from a single unit. New dumping type torque converters allow one-engine operation for light load requirements, but the "Twin" power is there when needed.

With Torque Converters, the Twin 6-110 costs 11% less than competitive engine A and 16% less than engine B without torque converters in the table below.

	TWIN 6-110	ENGINE A	ENGINE B
Rated H.P.	305	472	460
Continuous H.P.	394	372	375
Width (approx.)	66*	58	66
Length (approx.)	122*	163	92
Height (approx.)	83*	85	108
Weight (approx.)	12,500*	14,080	21,000

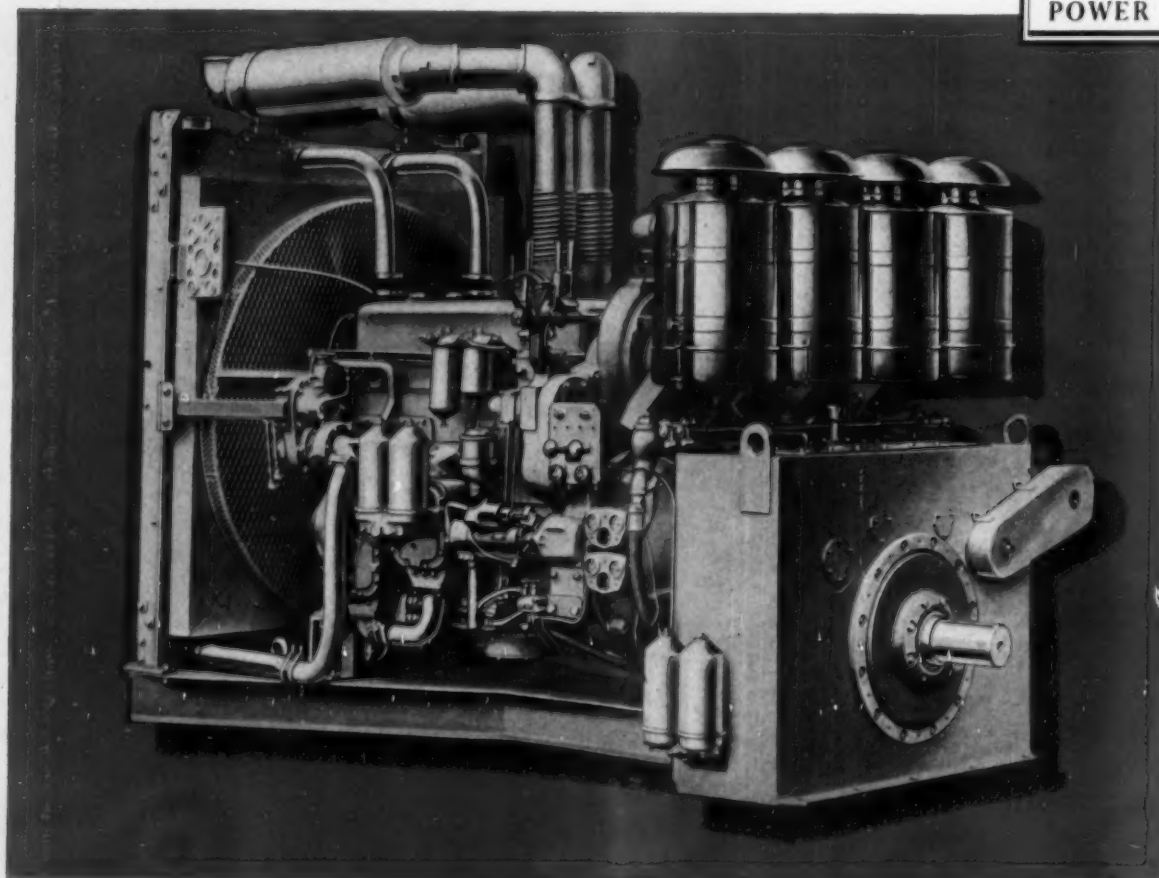
*With Torque Converters. All other figures without Torque Converters.

Get the complete story on General Motors' new Twin 6-110 Diesel from your distributor or supply company, or write us.

DETROIT DIESEL

ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICH.

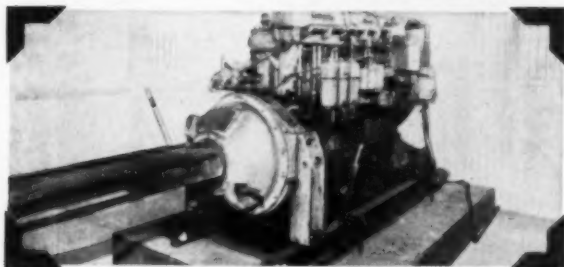
It pays to Standardize on



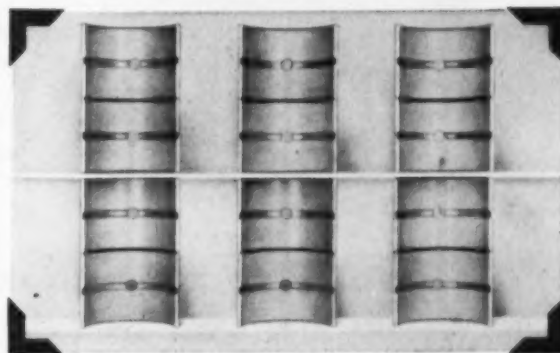
THE ENGINEER'S REPORT

DATA
LUBRICANT *RPM Delo Oils*
UNIT *Caterpillar D13000 diesel*
CONDITIONS *Constant load*
PERIOD *7650 hours*
FIRM *Dean H. Thayer,
Mesa, Ariz.*

Only 0.001" bearing wear in 7650 hours of work!



WORKING UNDER A CONSTANT LOAD pumping water, this D13000 diesel on the Dean H. Thayer ranch, Mesa, Arizona, ran 7650 hours before it was overhauled. An emergency made it necessary to run the engine for several days without safety cut-offs. Severe over-heating caused the governor to stick and the unattended engine reached a speed of approx. 1800 r.p.m. before it could be shut down.



OPERATED ON RPM DELO Supercharged-2 Lubricating Oil during the 7650 hours, con rod bearings showed only 0.001" greatest wear. There was no pitting and all parts were unusually clean.



NO MEASURABLE WEAR was evident on the pistons which showed original tool marks. Greatest wear on liners was 0.005. Piston rings were all free, oil rings were open. After inspection, main bearings, crankshaft, cam & cam bearings, piston pins and bushings were all put back in service.

REMARKS: This engine operates year 'round in widely varying temperatures. In wintertime, the irrigation water is used to prevent the crops from freezing.

There is an RPM DELO Oil to meet every heavy-duty engine operation condition. FREE BOOKLET on the RPM DELO Oils gives you complete information. Write or ask for it today.



TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oils keep engines clean and prevent wear



- A. Contain special additives that provide metal-adhesion qualities...keep oil on parts whether they are hot or cold, running or idle.
- B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean, helps prevent scuffing.
- C. Special compounds stop corrosion of any bearing metal, and oil foaming in both wet and dry sump engines.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA • San Francisco 20
THE CALIFORNIA OIL COMPANY • Barber, New Jersey

STANDARD OIL COMPANY OF TEXAS • El Paso
THE CALIFORNIA COMPANY • Denver 1, Colorado

TRUE STORIES IN MODERN RAILROADING

How a railroad increased its net earnings

— and put \$35 million into new equipment

This is the story of a railroad that made money by spending money. Or to be more accurate—by investing money in General Motors Diesel locomotives.

It begins several years ago when the Chicago, Rock Island & Pacific Railroad began pulling itself out of a bad financial plight by launching one of America's first fleets of Diesel-powered streamliners. It has carried right through, with each of these early General Motors-powered trains repaying its entire cost out of savings every year for ten years straight.

Last year dieselization of the Rock Island was completed when 88 new Diesel units were added. 2,458 new freight cars also were purchased. The locomotives and cars, together

with improvements to plant and structures, represented a capital outlay of \$34,879,000.

Net income for the year was \$22,641,225 compared with \$15,419,099 in 1951—a 46% gain, a result aided to some extent by the fact that floods and other unusual expense affected the 1951 figure. But that isn't the full story. In his annual report, President J. D. Farrington told stockholders, *"Many benefits resulting from our heavy capital expenditures were enjoyed only in part during 1952, as the delivery of both Diesel locomotives and cars was largely during the second half of the year. In 1953, we shall have the full benefit, and therefore can anticipate better operating performance with substantially increased savings from our investment."*

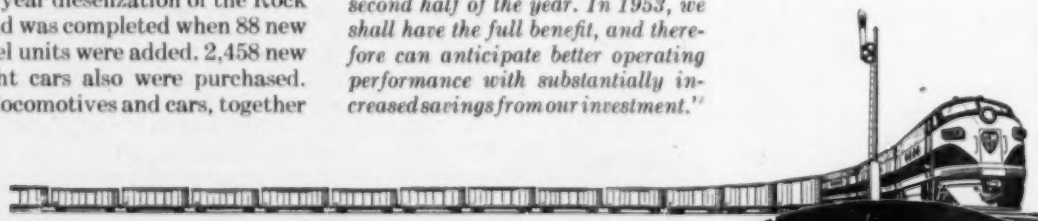
The superior operating performance of General Motors locomotives helps railroads attract new freight and passenger business. The savings help pay for additional cars and other new equipment, which enables railroads to give even better service.

Railroads cannot afford to delay—

**COMPLETE DIESELIZATION
WILL SAVE MILLIONS!**

For full information on how railroads can make the most of their investment in General Motors Diesel locomotives, write for booklet:

"Safeguarding Railroad Earnings."



**ELECTRO-MOTIVE DIVISION
GENERAL MOTORS**

LA GRANGE, ILLINOIS • HOME OF THE DIESEL LOCOMOTIVE

**GENERAL MOTORS
LOCOMOTIVES**

IN CANADA: GENERAL MOTORS DIESEL, LTD., LONDON, ONTARIO

**Why leading diesel
engine builders say—**

It's *Purolator*^{*} for Full-Flow!

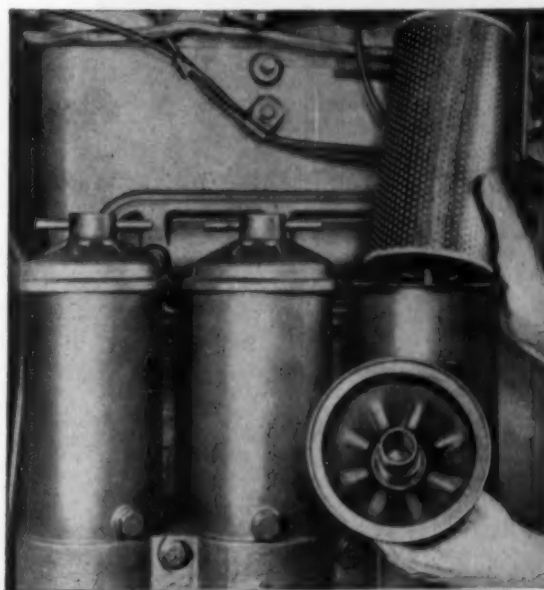


- **Full-flow rates within practical filter dimensions:** Purolator's famous "accordion-pleated" Micronic^{*} filter element has up to ten times more filtering area than old-style filters—gives high flow rates in a minimum of space.
- **Ultra-micronic filtration:** High flow rates are, of course, meaningless unless effective filtration is maintained, too. Electron micrographs prove that the Purolator Micronic filter stops particles down to *submicrons*—.0000039 in.!
- **Maximum dirt storage capacity:** The pleated design of the Micronic filter element provides many times more dirt storage space than old-style filters. This important advantage means uniform, efficient performance and a lengthy service life.
- **Minimum pressure drop:** The Purolator Micronic filter element introduces a remarkably small pressure drop in the lubricating system . . . permitting pumps of practical size and simple type.
- **Will not remove or absorb additives:** With Purolator Micronic filtration, you keep *all* the oil quality you pay for. The Micronic filter element will not strip additives . . . an important advantage with HD and heat-resistant oils.

Modern engines with full-flow lube systems . . . which filter *all* the oil at each pass through the engine . . . demand the best in filters. And most leading makers of diesel engines and vehicles agree that the best is *Purolator*^{*} . . . a fact proved over and over by their own impartial tests.

The story's the same with gasoline engines, too! The world's best known producers of passenger cars, trucks, tractors, earth-moving equipment, and stationary engines have found Purolators best . . . and install them as standard factory equipment.

If you are contemplating new designs or modifications of existing ones, remember . . . there's a well-engineered and use-tested Purolator for *any* filter application, including fuel oil, gasoline, hydraulic fluid, and water. Write for the Purolator catalog issued for your special field.



Purolator Micronic Filters in a typical Diesel full-flow installation. Although the Purolator Micronic filter elements measure only 4½ in. by 9 in., each one filters 9 gallons of oil per minute, giving a total of 27 g.p.m. for the complete filter unit.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey, and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles
*Reg. U.S. Pat. Off.



greatest name in diesel fuel injection...

**AMERICAN
BOSCH**

Look to American Bosch
for continued leadership
in diesel fuel injection.

STAYNEW INTAKE FILTERS GIVE

GREATER EFFICIENCY

plus

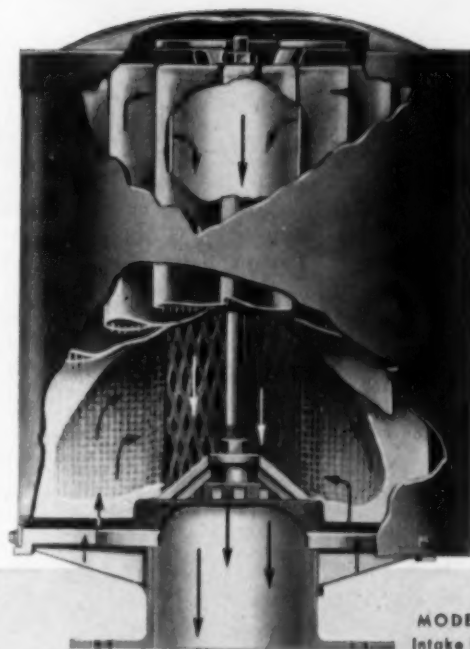
POSITIVE PROTECTION

IT'S A FACT! A filter which is 99.9% efficient is 9 times as effective as one that is 99.0% efficient. Why?—because the filter that is 99.9% efficient lets only *one-ninth* as much dirt into the engine. And, it's the dirt that *gets in* that causes the trouble.

The extreme efficiency of Staynew Intake Filters provides *positive protection*—keeps shutdowns and repairs at an absolute minimum. Efficiency actually increases with use. Staynew Intake Filters are efficient over a wide range of loads and are not affected by temperature changes. And, Staynew Intake Filters effectively protect vital engine parts without carefully held maintenance schedules . . . frequently operating two or more years without attention.

Get all the facts. Write today for Bulletin S.I.F.

Representatives in Principal Cities



MODEL D
Intake Filter



DOLLINGER

CORPORATION

12 Centre Park, Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

Production up 33%

- cable costs cut 75%

- fuel costs down 23%

Link-Belt Model K595 dragline stripping overburden for the Carbon Coal Company. This rig has a 75-foot boom and a 2½-yard bucket. An Allison TORQMATIC Converter smoothly transmits power from a 275 h.p. Diesel engine.



ALLISON TORQMATIC CONVERTER

SIMPLE DESIGN — one-piece cast converter elements—minimum maintenance

COMPACTNESS simplifies installation

DESIGNED for power applications in the 75 to 400 h.p. range

LONGER EQUIPMENT LIFE—absorbs shock, eliminates engine lugging, cuts maintenance costs

Here's another operator who's boosting production and cutting costs with Allison TORQMATIC DRIVES: The Carbon Coal Company operates two Link-Belt draglines, strip-mining coal near Grove City, Pa. The units are nearly identical—one has an Allison TORQMATIC Converter, the other is direct-driven—but there's a big difference in operating costs and production.

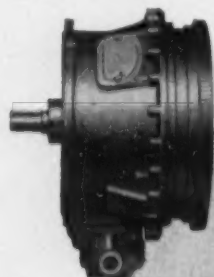
The Allison Converter absorbs shock loads so dragline cable on the

TORQMATIC-equipped unit lasts four times as long, saving \$2160 a year on cable alone, a reduction of 75%.

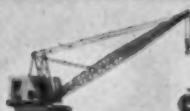
The TORQMATIC-equipped unit strips a 60x40x25 foot "lift" of overburden in 24 hours against 32 hours for the direct-driven unit, a 33% increase in production. A comparison of daily fuel records shows the friction drive unit consumes 130 gallons while the Converter-equipped unit uses only 100 gallons, a cut in fuel costs of 23%.

The TORQMATIC-equipped unit has rolled up such an impressive performance record that this operator intends to specify TORQMATIC DRIVES in all his new heavy-duty equipment. You, too, can cut your costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

ALLISON DIVISION OF GENERAL MOTORS
Box 894DD, Indianapolis 6, Indiana



Allison TORQMATIC DRIVES



COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES * TRUCKS * TRACTORS * SCRAPERS * SHOVELS * DRILLING RIGS

**2 SUPAIRTHERMAL* Engines
give "IRVING CROWN"
TOP EFFICIENCY**

**800 hp Diesels swing twin screws
at 300 rpm direct drive**

* Trademark

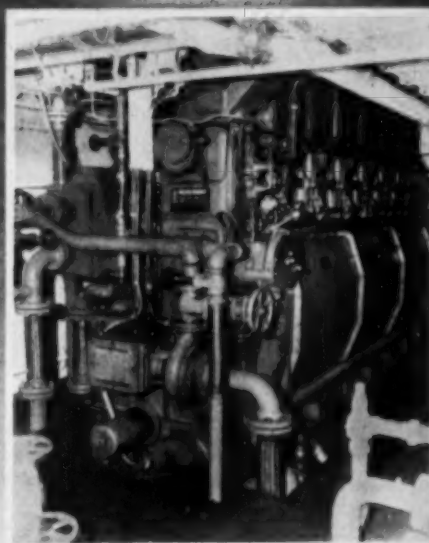
POWER packed with two direct-drive, direct-reversing 800 hp Nordberg SUPAIRTHERMAL Diesel engines, the "Irving Crown", a new 103-ft. twin screw pusher type towboat, was recently placed in service by Material Service Corporation of Chicago, the world's largest producer and distributor of construction materials.

SUPAIRTHERMAL engines operate at 160 lbs. Brake Mean Effective Pressure . . . producing one-third more horsepower than conventional turbocharged engines of comparable cylinder size and speed. As a result, more compact power is installed in a limited space with the simplicity of desirable slow speed, direct drive Diesel propulsion. There is no better testimonial to SUPAIRTHERMAL propulsion than the performance of the "Irving Crown".

For full details about Nordberg SUPAIRTHERMAL engines, in sizes from 535 to 4260 hp, write for BULLETIN 191.

SM253

NORDBERG MFG. CO., Milwaukee, Wis.



Close-up view of one of the two 800 hp Nordberg main propulsion Diesels in the "IRVING CROWN".



IN BUSINESS SINCE 1872

NORDBERG

DIESEL ENGINES





...with TYCOL lubricants on hand!

It pays to buy a "Diesel-Designed" Lubricant! ... It takes "something more than a motor oil" to counteract excessive wear in Diesel engines — and we proved it with Tycol Adeltran 40! In this instance, a Diesel engine was operated for one year with a competitive oil. An overhaul by the manufacturer turned up these conditions: all liners had to be replaced as well as piston rings ... 2 top compression rings were stuck and all rings were gummed up. After the switch to Adeltran (for the same operating period) liner wear was negligible ... filter life was considerably extended ... all rings were free and in excellent condition ... and owner reported an exceptionally clean engine base. For full details on Adeltran, contact your local Tide Water Associated office!

Over 300 Tycol industrial lubricants are at your disposal ... engineered to fit the job!

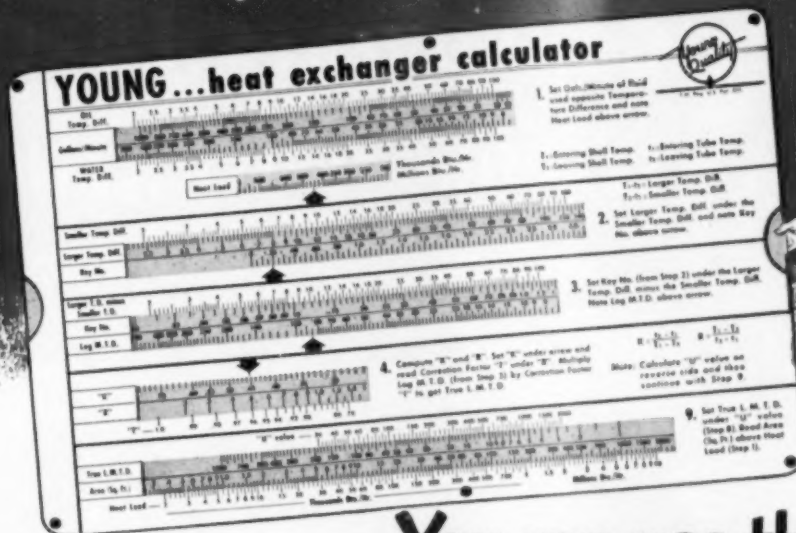
REFINERS AND MARKETERS OF VEEDOL ... THE WORLD'S MOST FAMOUS MOTOR OIL



Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco
Toronto, Canada



If You Specify Heat Exchangers...



...You can use this NEW YOUNG HEAT EXCHANGER CALCULATOR

AN EASY WAY TO SELECT THE CORRECT UNIT FOR YOUR JOB



This exclusive Young Heat Exchanger Calculator is an engineering tool specially designed to help you calculate and specify Young shell and tube Heat Exchangers. Designed to save you time, the Calculator enables an engineer to determine quickly individual heat transfer coefficients for the shell side and tube side, and by combining them with suitable fouling factors to determine over-all heat transfer coefficients. It also gives you a visual picture how the size of a Heat Exchanger will vary with fluid temperatures and velocities.

YOUNG RADIATOR COMPANY

Heating, Cooling, Air Conditioning Products for Home and Industry
Heat Transfer Products for Automotive, Industrial, Gas or Diesel Engine Applications
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Get Your Young Heat Exchanger Calculator from Your Nearest Young Representative

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1988 Nome St., Aurora, Colo.

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Pneumatic Products
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NEW YORK
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NORTH CAROLINA
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P.O. Box 1261, Greensboro, N. C.

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Paquin Co.
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Oklahoma City, Okla.

OREGON
Hydraulic Power & Equip. Co.
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Robert Taylor & Sons
P.O. Box 1223, 1077 Main St.
Salt Lake City, Utah

WASHINGTON
John F. Gertz Co.
3242 Eastlake Ave., Seattle, Wash.



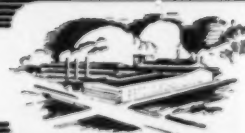
PRESSURE VESSEL COMPONENTS FORGED TO EXACTING SPECIFICATIONS

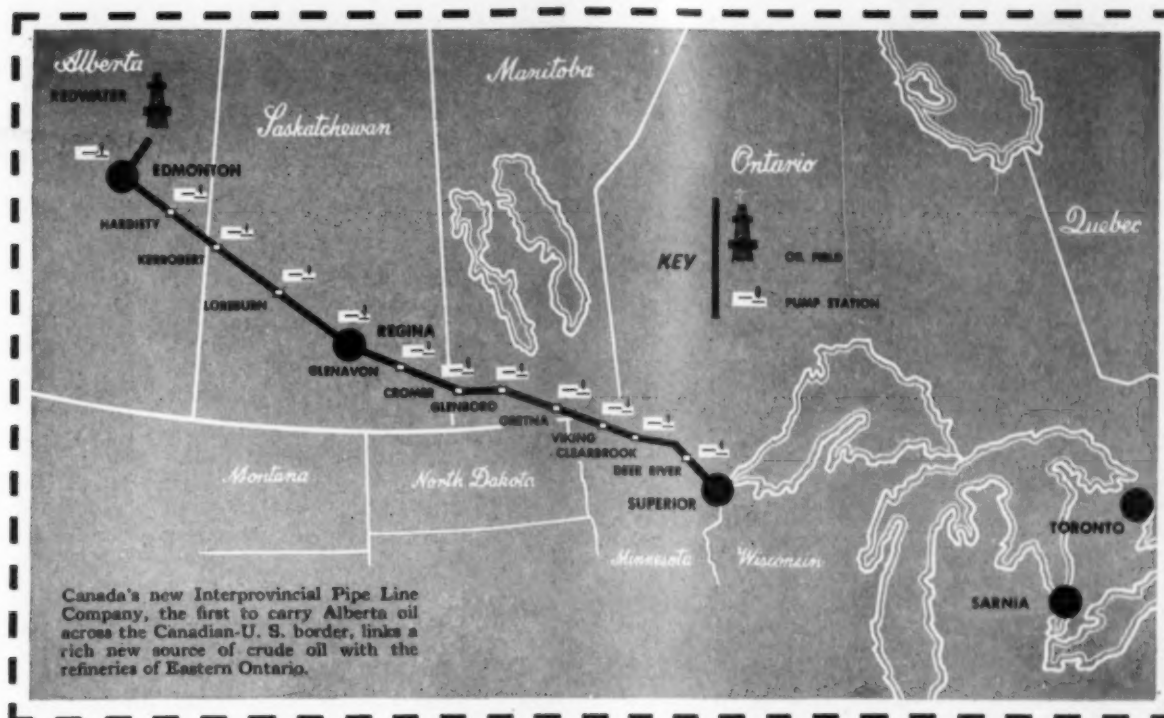
AT
ERIE FORGE & STEEL CORPORATION
... One Control. One Responsibility

ILLUSTRATED here are several pieces forged to exacting specification for a leading manufacturer of pressure vessels. Metallurgical specifications and dimensional requirements were rigid, close tolerances were held throughout. Here at Erie Forge & Steel Corporation, opportunities to serve original equipment manufacturers are welcomed. Here under one roof are all the requirements necessary to meet every forging requirement. Every step from ingot to finished part is under one control, one responsibility. Consult with Erie Forge & Steel Corporation on your next forging requirements.



ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA





Alco Diesel Engines Pump Alberta Oil 1137 miles to U. S. Port on Great Lakes

Canada's new 1137-mile Interprovincial Pipe Line and its American Subsidiary, Lakehead Pipe Line Company, Inc., offer an outstanding example of international teamwork—and open a new era in the history of Canadian petroleum.

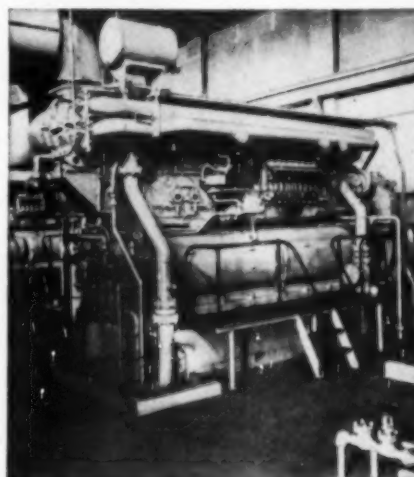
Served by Alco Diesel Engines, this first major Canadian pipeline (approximate annual capacity: 58.5 million barrels out of Edmonton) carries crude oil from the rich fields of central Alberta to the strategically located Great Lakes port of Superior, Wisconsin, from where it is transported to the refineries of Eastern Ontario.

Nine of the line's twelve pumping stations are located in Canada, three in the U. S. (see map). Each is powered by either two, three or four Alco Diesel Engines. Units for the Canadian stations were built under Alco license by the Dominion Engineering Works of Montreal; U. S. units were built in Alco's diesel plant at Auburn, N. Y.

Some of these, 12½ in. x 13 in. engines, have six cylinders and others, eight. Some are straight diesel and others are dual fuel. All of the engines are suitable for burning available crude oil.

The new Interprovincial Pipe Line is just one more major installation where the compactness, efficiency and flexibility of Alco Diesel Engines are helping to meet the free world's growing demand for petroleum products.

Your nearest Alco sales representative will be happy to give you detailed information on Alco Diesel Engines. Contact him at New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady or St. Louis.



Eight cylinder, 12½ in. x 13 in. Alco dual-fuel Diesel Engine, manufactured in Canada by Dominion Engineering Works, Montreal, shown in engine room of the Interprovincial's Edmonton, Alberta, pumping station.

ALCO DIESELS

AMERICAN LOCOMOTIVE COMPANY
SCHENECTADY, N. Y.



The mark of modern engineering



Diesel Engines

(2-CYCLE)

*Do your diesels
control temperature
in this critical area?*

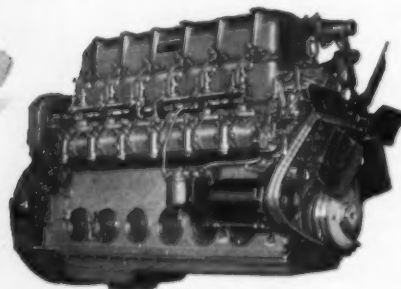


Note the arrangement of intake ports on this unit cylinder head and liner assembly for a P&H Diesel. This entire area, including the spaces between ports, is fully water-jacketed to insure uniform cooling. No other 2-cycle diesel in this horsepower range controls temperatures throughout the entire stroke of the pistons!

What does this mean to you? Lower temperatures give you greater protection against wear and tear — against parting of metals — against maintenance, repair and replacement problems.

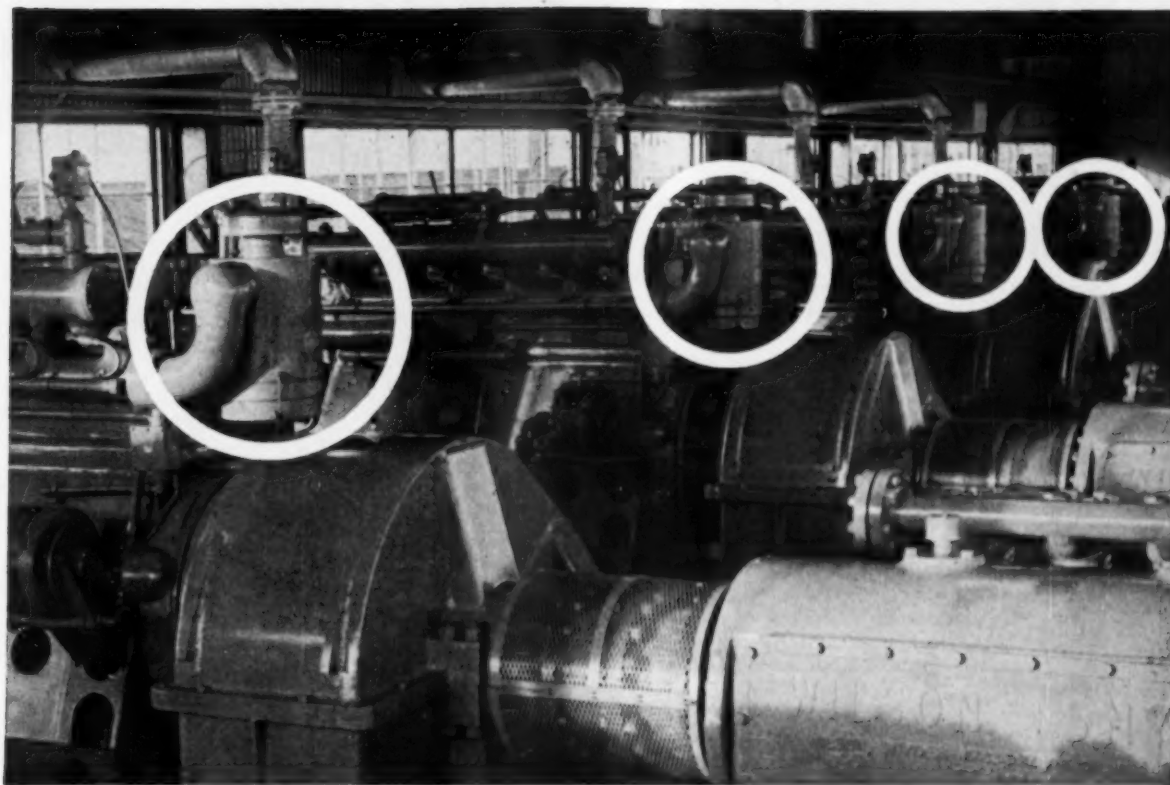
This is only one of many advantages you'll find in the advanced line of P&H Diesel Engines. They're available in 1, 2, 3, 4 and 6-cylinder models — from 20 to 138 h.p. Ask your nearest P&H Diesel representative for full details. Or write us.

P&H DIESEL DIVISION
HARNISCHFEGER
CORPORATION
CRYSTAL LAKE, ILLINOIS



the **P&H** *Line*





Union Oil's new Junction pipeline station uses Air-Maze oil bath filters, oil separators and breather filters

THESE ENTERPRISE DIESELS on the job at Union Oil Company's new Junction, California, pipeline station get dirt-free air from Air-Maze stack type oil bath filters.

Intake air is passed through an oil-filled bowl, then through an oil-washed filter media. It comes out "scrubbed" clean, preventing damage to highly polished pistons, liners and rings of the engine. Servicing's no problem either. The bowl can be easily removed without disconnecting the filter from the engine.

The Enterprise diesels are also equipped with Air-Maze oil separators. They remove entrained oil from

crankcase ventilation air drawn into engine intake, reducing the fouling of cylinder ports, valves, and rings.

Air-Maze oil wetted type breather filters on Wilson-Snyder pump crankcases clean the "breathing" air, keep dust from getting at bearings and other moving parts.

Leading manufacturers specify Air-Maze oil bath filters, oil separators and many other types of air and liquid filters on original equipment. For help with your filter problems, contact your nearby Air-Maze representative or write Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE

The Filter Engineers

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

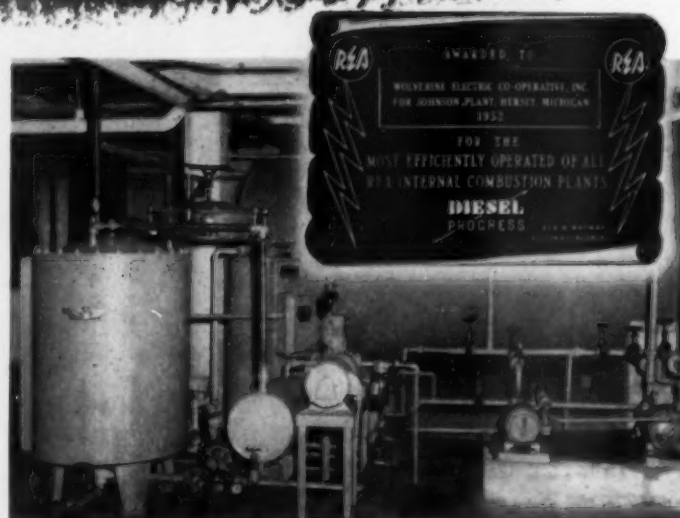
YOUR **PROOF** OF EFFICIENCY

HOFFMAN FILTERS Deliver Dependable, Low-Cost Service for Power Generating Plants Like These:

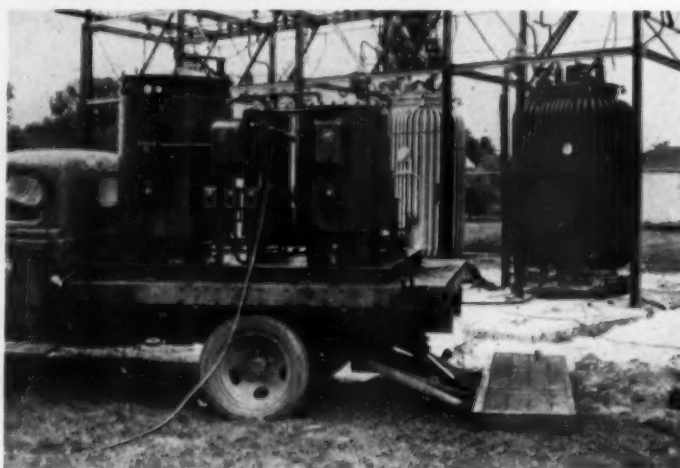
WOLVERINE ELECTRIC COOPERATIVE, INC. — At the Johnson Plant in Hersey, Mich., which won the 1953 "Diesel Progress" Efficiency Award, Hoffman Cartridge Filters and 300 g.p.h. Oil Conditioner contribute to lube and fuel oil clarity. Shown above is the Hoffman oil conditioner unit used for batch purification of lube oil. Soluble contaminants are driven off by the vaporizer in this unit and abrasive solids are removed by its cartridge filter component. In addition, three Hoffman Cartridge Filters, with 7x18 throwaway cellulose cartridges, serve each of the Fairbanks Morse 3,500 H.P. engines with lube oil on a by-pass basis. A fourth Hoffman filter handles fuel oil for these machines.

IOWA POWER & LIGHT CO. — For its program of preventive maintenance covering 24 substations in a territory radiating 150 miles from Des Moines, this company uses a 300 g.p.h. Hoffman Oil conditioner mounted on a truck chassis. Transformer and circuit breaker oils can be quickly restored to safe operating limits in this manner. The reclaiming is quickly connected to the equipment. It is easily operated — requires no highly skilled or trained technical personnel. The Hoffman oil conditioner has demonstrated year-round dependability in this company's campaign against oil sludging and oxidation.

CORN BELT POWER COOPERATIVE, Humboldt, Iowa — Since 1950, this truck-mounted Hoffman Oil Conditioner has traveled this system's 12,344 miles of transmission lines to keep transformer and circuit breaker oils at safe operating levels. This method has proved convenient, quick and economical. The 300 g.p.h. conditioner is quickly connected to equipment for recirculation of oils through the filter using Fuller's earth to remove solid particles of carbon, products of oxidation such as organic acids, gums, resins and asphaltines resulting from operation of the transformer at high temperatures. Filtered oil then passes through a vaporizer which dehydrates and degasifies the oil to produce an end-product free from oil contamination and moisture and having safe dielectric strength limits.



Hoffman 300 g.p.h. oil conditioner for lube oil reclamation.



Iowa Power & Light mobile unit for reconditioning insulating oils.



Hoffman Oil Conditioner, as "mobilized" to recondition insulating oils for Corn Belt Cooperative.



The **HOFFMAN FLO-master**
A full-flow filter to remove lube oil abrasive particles down to 20 microns or smaller. Minimum initial pressure drop. Exclusive throwaway cartridge with 45 sq. ft. of filter area. Sizes from 75 to 900 g.p.m. Write for Bulletin A-873.

HOFFMAN Cartridge FILTERS, 7x18 or 11x18 cartridges. Replaceable or throwaway types—cellulose or Fuller's earth. By-pass or intermittent operation—lube or fuel oils. 3 to 480 g.p.h. capacities. Write for Bulletin A-886 and A-649.

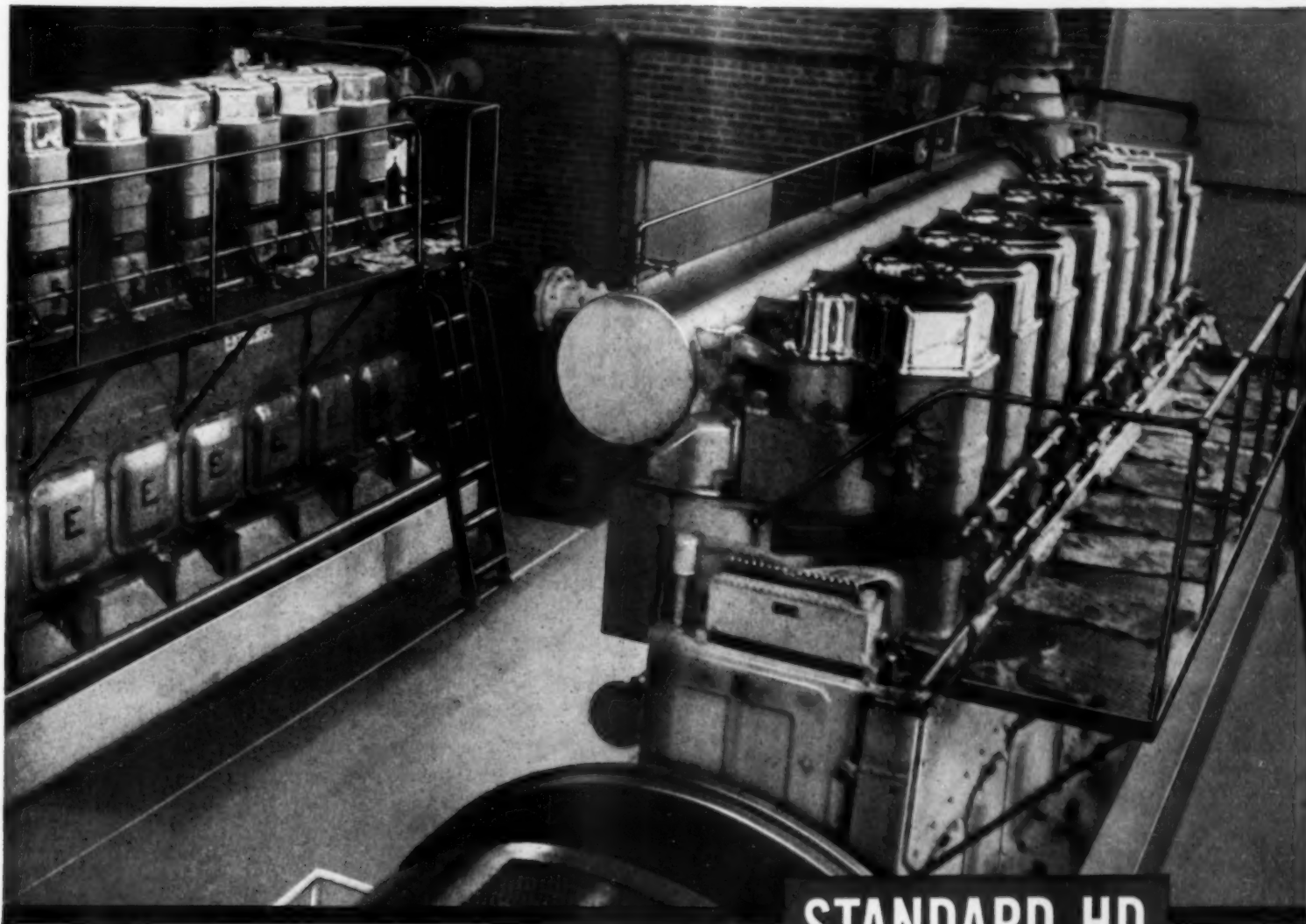


HOFFMAN Oil Conditioners. Complete reclamation of used oils. Remove both soluble and insoluble impurities. Capacities for 25 to 600 g.p.h. Write for Bulletin A-667.

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● In 1947, operators of a midwest municipal power plant put a new 1060-hp diesel unit into service, using STANDARD HD Oil for lubrication.

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Installed in 1950, a 1755-hp, supercharged diesel engine in this plant is running up another record for low maintenance with STANDARD HD. After more


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STANDARD OIL COMPANY



(Indiana)

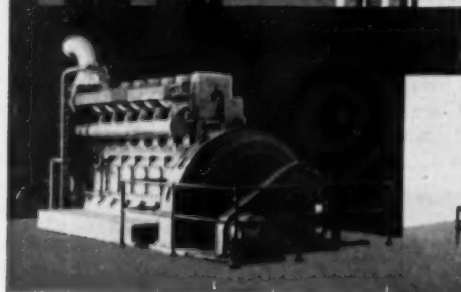


helping to generate a **power-full** "Municipal Story"

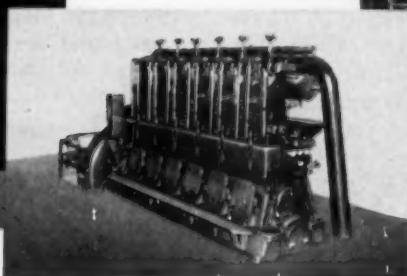
All over America powerful diesel engines are meeting the dual challenge of increasing load capacities and lowering the cost of power production for municipalities.

It is only natural that each year sees an increasing number of diesels in municipal use, for the economy of diesel operation has proved to be an important contribution toward reduced taxation and balanced city budgets.

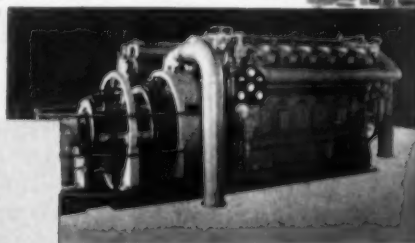
It is also significant that more and more cost-conscious municipal operators are installing diesel power plants with Bendix Fuel Injection because Bendix is long experienced in working with diesel manufacturers in achieving maximum performance with low operating costs.



Nordberg 800 H.P. 6-Cylinder Diesel



Baldwin 750 H.P. 6-Cylinder Diesel



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NEW SERVICE on the MISSISSIPPI



The Barge GM Service, located at the foot of Market Street, St. Louis, Mo., is the Cleveland Diesel Engine Division of General Motors new service outlet for operators of towboats on the Mississippi River.



To give work boat operators fast on-the-water service, Cleveland Diesel has opened a new 250-foot barge with office and shop facilities on the river front at St. Louis. Trained representatives are ready to provide direct factory service to GM Diesel engine operators.

This new, floating service station is another one of the many service outlets for General Motors Diesels on the inland waterways and coastal ports. These outlets are providing fast on-the-spot service to operators of General Motors Diesels.

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO



Tie Up to GM Service

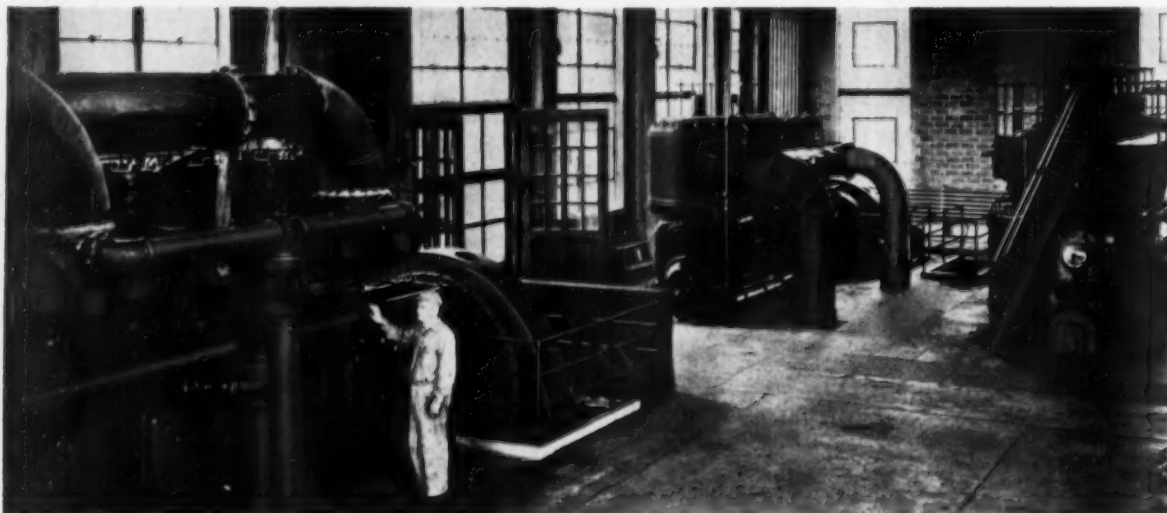
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SINCLAIR DIESEL LUBRICANTS
save wear and replacement

HIGHER PRODUCTION at HY-ROCK

Two International TD-6s help increase production 300% for Indiana quarry

G. W. Bowen, president, Hy-Rock Products Company, Marengo, Indiana, was worried that his TD-6 would be too small for the job when he bought it in 1946.

But he isn't worried now—and he has two TD-6s working for him.

On the go 48 to 52 hours a week, these two Internationals have helped Hy-Rock increase production 300 per cent, to 170,000 tons per year. They handle every heavy job on the surface and dig out limestone a quarter-mile underground.

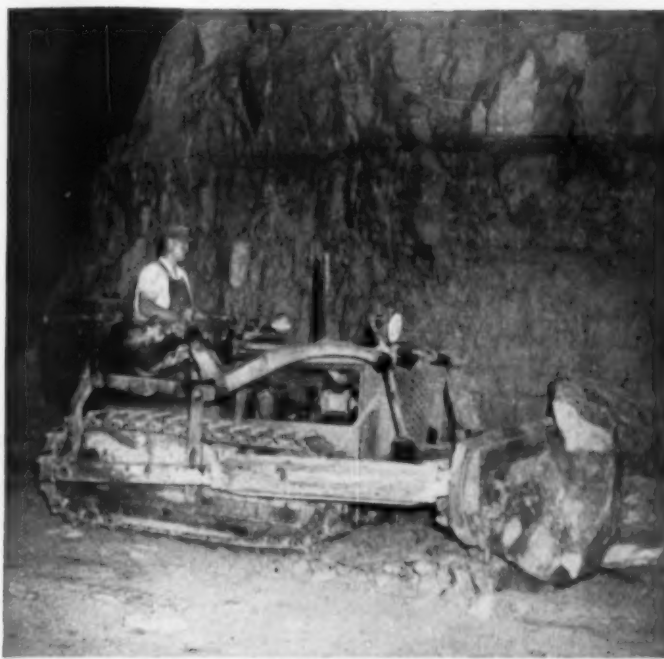
Want to know more about how International power can help raise your production and lower your costs? See your International Industrial Distributor for the full performance story. Look over his big parts department and his factory-designed service plant. You'll understand why more and more mine and quarry operators are equipping with International for the "Power that Pays."

INTERNATIONAL HARVESTER COMPANY,
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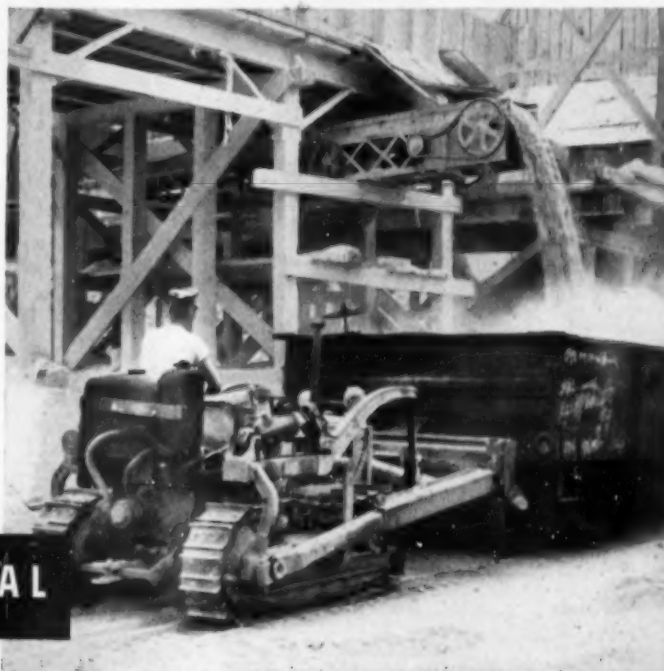


INTERNATIONAL

POWER THAT PAYS



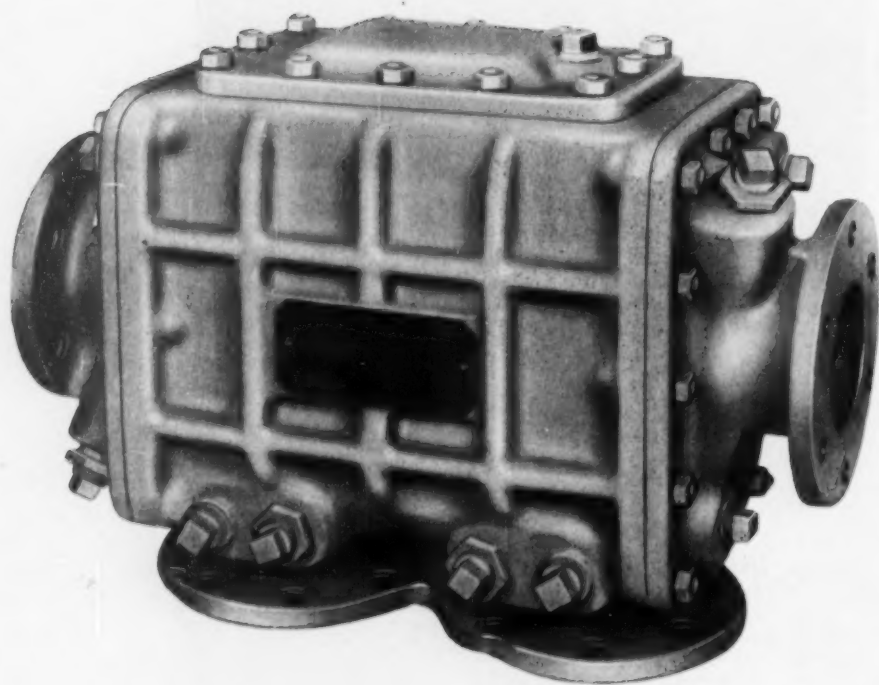
ONLY ACTIVE UNDERGROUND LIMESTONE MINE in Indiana. International TD-6 crawler works a quarter mile underground at Hy-Rock quarry.



TD-6 TURNS LOCOMOTIVE. This rugged little International bosses from one to nine loaded railway cars in addition to handling a host of other jobs below and above the ground.

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*for
dependable
heat
exchangers*



HARRISON
RADIATOR DIVISION
GENERAL MOTORS CORPORATION
LOCKPORT, NEW YORK

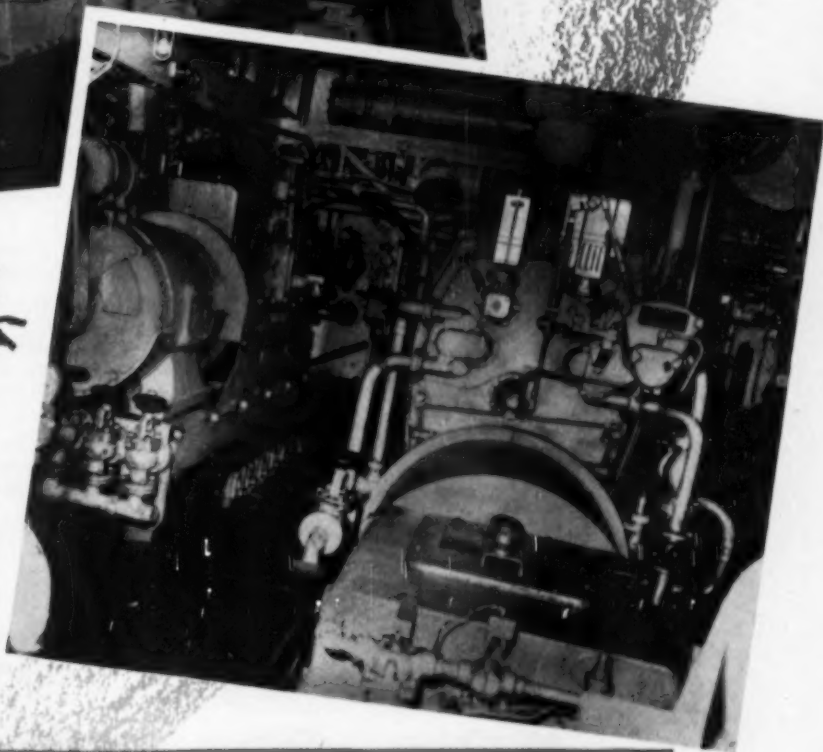
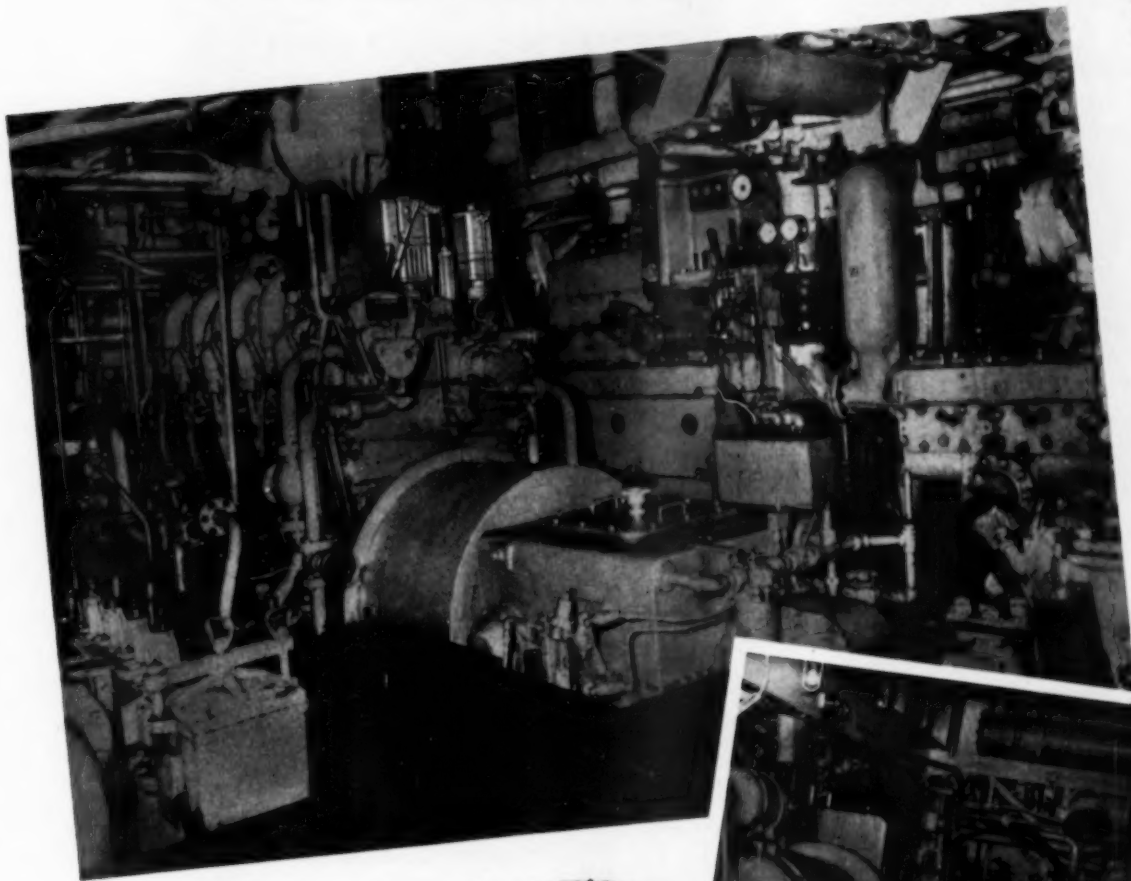
Diesel engines must operate within a specific temperature range if they are to deliver the performance that has been built into them. And Harrison heat exchangers, by providing efficient cooling of jacket water and lube oil, insure the proper operating temperatures. Harrison has been designing and building heat transfer products for more than forty years, and the knowledge gained from this experience qualifies us to be of service to you. We welcome the opportunity to discuss your requirements.

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WHY UNDER-POWER YOUR EQUIPMENT



when **BIG**
displacement
Buda Diesels
give you so many
advantages?



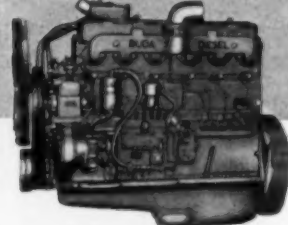
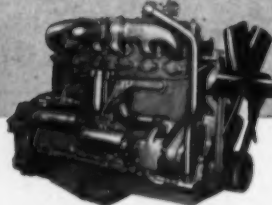
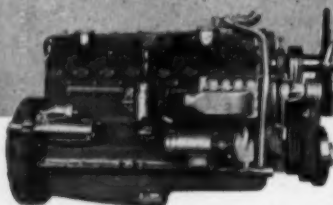
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350 HP at 2100 RPM



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Will Prepare the Oil for
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In one specific instance, a De Laval bowl removed from 13 to 15 pounds of dirt in 5 hours before cleaning was necessary!

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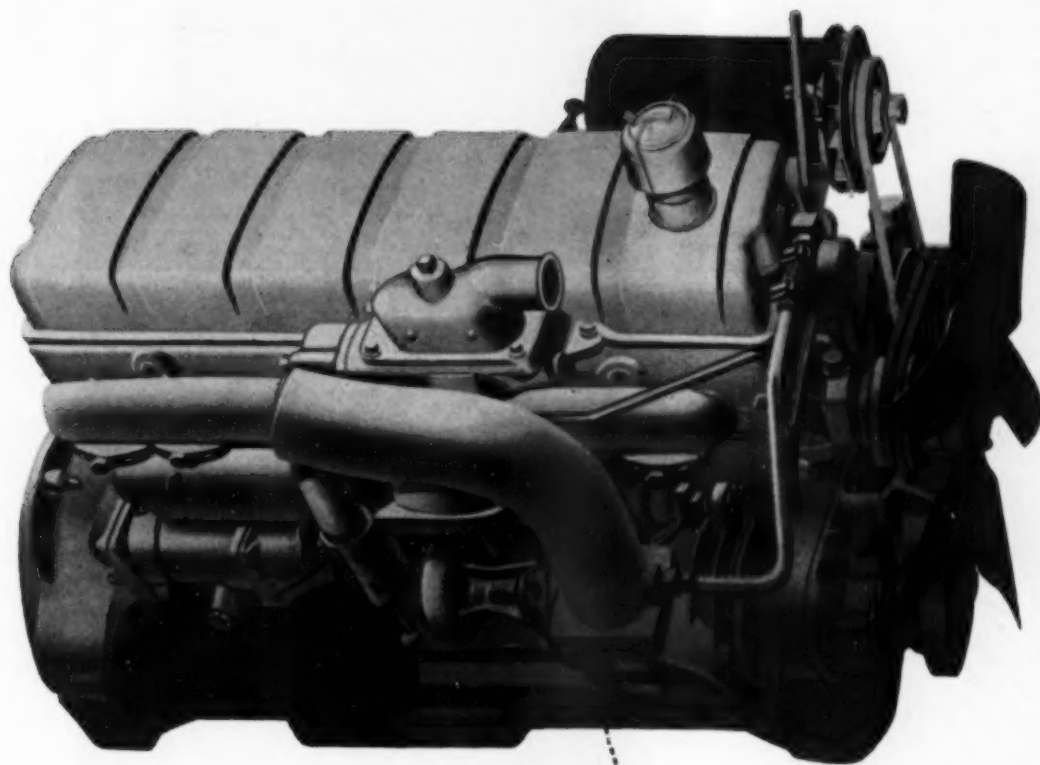
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If you operate medium heavy-duty trucks ...

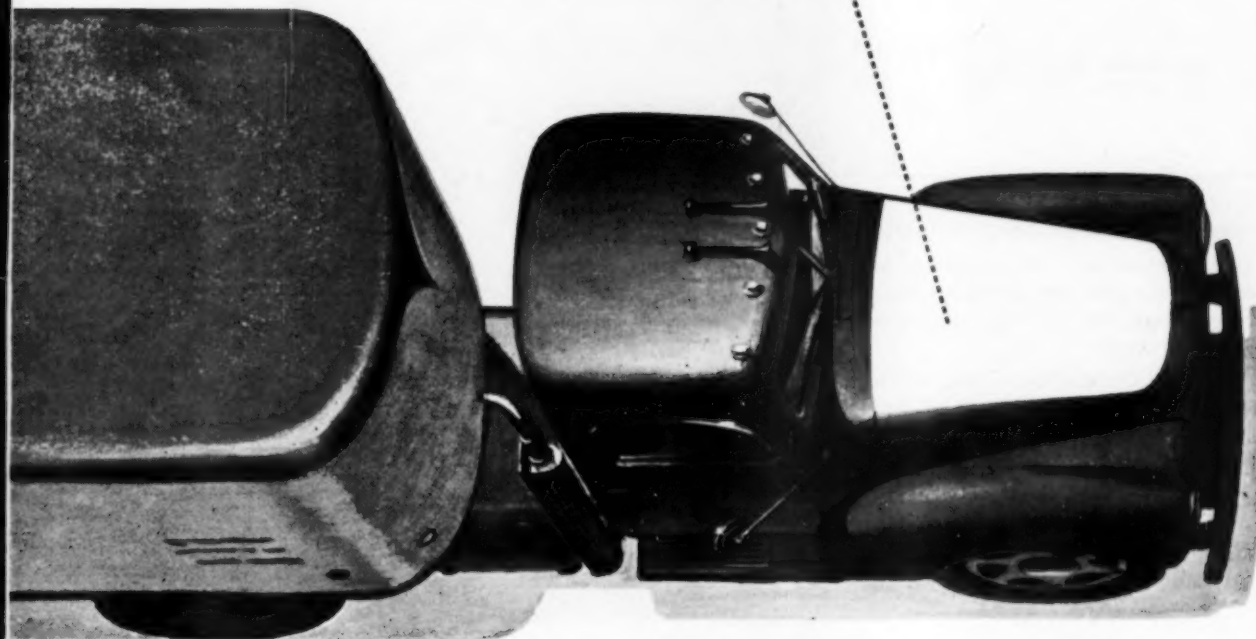
This new 150 h.p. diesel now makes Cummins



DIESEL PROGRESS



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Cross-sectional view of a typical Cook 101-P Chrome Faced Ring.

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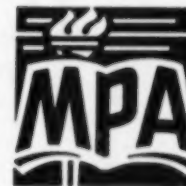


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And that's why every engine is given a thorough torsional analysis to help determine proper selection of flywheel, couplings and shafting which checks vibration and insures smooth engine operation.

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A NEW DIESEL APPLICATION

SOMETHING "hot" is developing in the small boat field and a new diesel market may be opening up. Built by the Monson Boat Works from plans by Edwin Monk, naval architect, for the Evans Engine & Equipment Co., Inc. of Seattle, Washington, the 24-ft. express cruiser *Jimmy D* is exceeding all expectations.

When the GM Detroit Diesel Division's new, compact Model 4-51 became available, Evans Engine & Equipment Co. Inc., Seattle, distributors of GM diesels, saw tremendous possibilities in the new model. They decided to take a practical gamble on the engine's ability. Some very important questions were to be answered. Would the engine be powerful enough for its weight, would it be smooth or quiet enough? Would a boat designed for the engine be fast enough for sport? Would the cruising range be increased on the same tankage and would the price be reasonable enough?

It was a big order for a small engine and, naturally, interest in boating circles ran pretty high. The *Jimmy D* was lowered into the water a few weeks back and underwent her first trial runs. We quote Mr. A. W. Evans of Evans Boat & Equipment on her performance, "To say that we are satisfied is to say practically nothing. We are really excited because we have proven that the new GM 4-51 is not just merely good enough for the exacting demands of the small boat market, but actually excels in every respect. The *Jimmy D* did not just qualify. It ran away from our highest expectations." Mr. Evans' enthusiasm was warranted. The craft is smooth, quiet and delivers the power. The compact engine takes up little space in the small cockpit. It starts at the touch of a button and has amazing acceleration. It is economical fuel-wise and, perhaps the most important of all to boat owners, it is safe. Gone is the ever-present danger of fire inherent in the presence of the gasoline engine. The boat

handled beautifully with plenty of dash and pick-up, planed at about three degrees, smoothly and without pounding. Vibration in the cruising range was practically nil and the problem of damping out engine noise is presently being overcome.

Tests were conducted with a 14 x 12 Federal Equipoise propeller. A top engine speed of 2700 rpm. was achieved with this screw. Run several times in opposite directions over a measured mile course, the boat hit 22.3 statute mph. At 2000 rpm., hull speed was 14.5 mph.

As soon as the *Jimmy D* has been completely finished and has all her equipment aboard, further performance tests will be conducted. However, the first test runs have completely vindicated Evans' faith in the GM Detroit Diesel Division's Model 4-51 to deliver the goods where diesels have up until now never been considered practical.



From left to right, Chuck, A. V. and Bruce Evans whose venture in powering a small craft with the GM 4-51 has opened up a new market for diesels.

The GM 4-51 diesel in the *Jimmy D*. Note the small amount of space occupied by the engine, leaving plenty of room in the small cockpit.



BAGDAD: DIESEL ACHIEVEMENT

By F. HAL HIGGINS

OUT 120 miles northwest of Phoenix is the Bagdad mine, owned by the Bagdad Copper Corporation headed by J. C. Lincoln, noted industrial giant whose name heads a welding company he founded. The old saw about how "they laughed when I got up to speak" might be brought in to point up the fact that the fabulous Mr. Lincoln is neither a miner nor a pal of the New and Fair Deals that were running the country and handing out or withholding cash and favors from Washington when the rugged individualist insisted on running his electric welding factory as he wished for better labor relations and profits to his company than might be had from allowing a government-labor board to set the rules and stir up his workers.

The Bagdad mine story goes back scarcely 40 years, according to Director Manning of the Arizona Department of Mineral Resources. Those four decades were never profitable or attractive. The Bagdad is the smallest of Arizona's low-grade copper mines and has 20,000,000 tons of 0.9 percent copper ore in reserve but with reserves expanding under the management of E. R. Dickie. Mr. Dickie was picked by Mr. Lincoln to bring the mine from its rating as a "rat-hole" for investments to a profitable operation when he bought control in 1944. Labor was short and block caving was not successful enough to meet the demands of Mr. Lincoln and his manager in 1945. Here it was that the mettle of the manager backed by the "venture capital" of Mr. Lincoln was proved. Dickie made the decision to start stripping and moving overburden and ore by diesel truck. It made Bagdad a mine and the reputation of both Dickie and Lincoln in the mining field where few have survived the ups and downs of war and peace, nature's hazards and labor costs.

"Come along out to Bagdad," answered Harold

Olson of Arizona Equipment Sales, Inc., when the writer contacted him at his Phoenix office where he is one of four partners and parts manager.

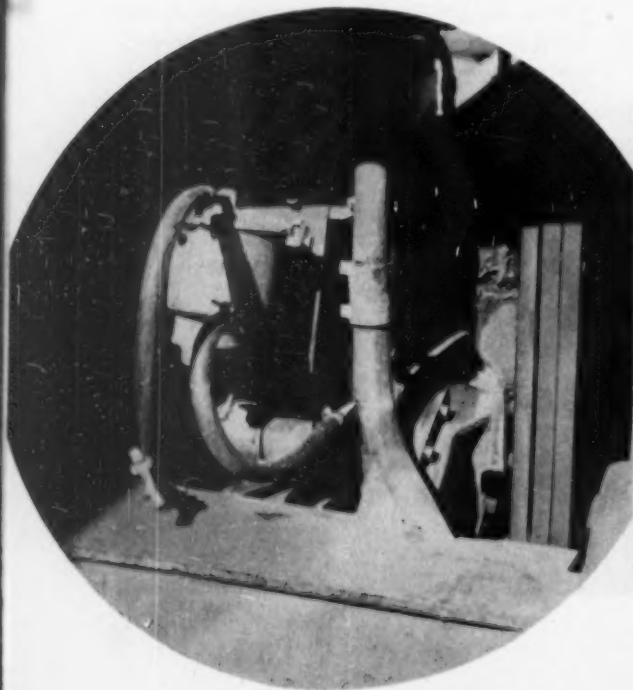
Out at Bagdad, we found a comparatively new company town with diesel tractors and blade grader levelling off and shaping up the new million-dollar school and civic center development. These were both International diesels—a TD24 pulling a scraper and an Adams blade shaping up and smoothing the streets. On over the crest of the rise a half mile or so away, we rounded a corner and there was spread out the Bagdad open-pit mine with fast moving Dart trucks powered by Buda super-diesels roaring up and down the curved grades to and from the benches where electric shovels loaded the trucks. Wherever electric power is available, the big P. & H., Bucyrus Erie and Marion shovels are so powered, admit the engine builders. When it comes to heavy going such as these shovels handle, the electric has won the call from the mines.

At the office we met chief engineer George Coville first before manager E. R. Dickie arrived. We listened to their brief explanations of the Bagdad operations and equipment. Benches are established at 45- and 50-foot vertical intervals and stripping of waste starts at high elevations on the sides of Bagdad Canyon. Ore, waste and low grade are broken up by 7 in. churn drills, loaded by electric shovels into the fleet of Dart trucks powered by Buda super-diesels. The trucks are supplemented by the revolutionary LeTourneau "Tournarockers" that are powered by Scott-Hall L-P gas in order to reach up to 450 hp. with light weight engine that the daring Bob LeTourneau and staff figured was the answer to just such jobs as this. Over at the Kennecott and Phelps-Dodge strip mines at Ray, Bisbee and Douglas we had noted twin Cummins diesels in the big Euclids stepping up to this

bigger power asked by these copper mine managers. All are putting the pressure on equipment engine, tire, torque converter and cleaner designers and builders.

Said the Bagdad engineers and shop foreman J. L. Crawford, "We have 26 pieces of dieselized equipment: 10 Darts and 10 Euclids, all powered by Budas; 2 International TD24s and 1 International TD18, 2 Adams blade graders with International Diesel, 1 Caterpillar D8. The three Tournarockers are Hall-Scott butane, or L-P gas, which means at present both butane and propane are in the fuel mixture. We have 10 mechanics and two service mechanics to keep this fleet of equipment rolling. We bought our first four Budas in Euclid trucks in November, 1948. They are still in service here. The first two years we ran them three shifts a day, round the clock, 7 days a week. We have cut to 2 shifts now. The first supercharged Buda engines were put on the job in 1950. Training operators

A lot of oil field products power the strip mine operations. Here is a platform of Standard Oil of California drums to service the Bagdad operation.



◀ Perry water filters are installed on all the Buda engines on the Bagdad strip mine job.





The long, snakey, up-hill climb at the Bagdad pit puts the big test up to diesel engines as they rush copper ore and overburden to hopper or dump.

for these big fast ore trucks is one problem, of course. We get drivers from all over as they come to us for jobs. Some have been at other mines, some come back from war service. A lot depends on the driver, of course, and we start a man on such jobs by training him for four or five days riding beside an experienced driver on the job. We have lost no drivers or trucks by so doing, but operators make a lot of difference in wear and tear on tires and trucks."

The visitor glanced out at the long platform filled with Standard Oil of California drums of oils and greases and asked about fuels and greases. The whole fleet of trucks get regular service every night, replied the shop manager. "We check transmission, final drive, differential, and change oil every 100 hours. The filters get a checking and cleaning at

time of oil change. Shifts are staggered so that the service goes along without delaying any trucks to slow the flow of ore to the dump, two or three trucks coming in each night. Tires are a big item on strip mining here. The only thing I see that stands out on tire development as proved on this job is that nylon has given a tire that stands up better because of less rock breaks in the tires."

"We get more 'caps'," spoke up the mechanic in charge of re-capping, which is a big job on every strip mine. "I would say the tires are 25% better since rayon came in to add life and permit us to give them 4 recaps on the 1800s. We can run a tire four months. We are giving all of the standard tires a place—U. S. Royal, Sieberling, Firestone, Good-year. The Le Tourneau Tournarockers are all equipped with Firestones and right now is costing

\$2 a mile per tire to operate those heavy pieces of new equipment."

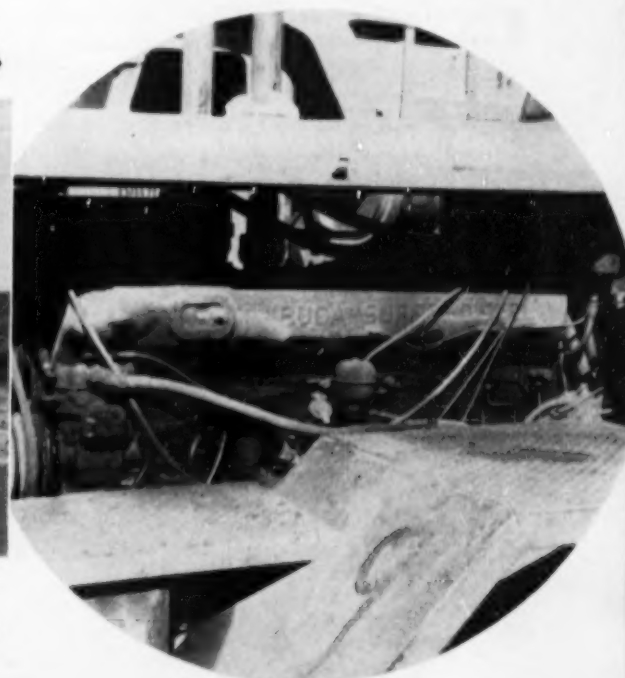
"Torque converters? They give us more miles on rubber than we could get before they came into the picture. That over-running clutch helps hold the truck back and equalize the pull on jack rabbit starts to speed up the job without jerking such big loads for such rapid tire and engine wear and overhauling. The Darts are all equipped with Twin-Disc torque converters, Perry filters for water, Lub-refiner oil filters and most of them have Donaldson air filters. On the 'Tornadoizer,' there is Cuno oil filter, Perry water filter, Buda diesel engine for power, electric LeTourneau winch on rear, Vortex air cleaner, dozer blade and winch electrically operated by the long-discussed LeTourneau system that has finally come through as a successful innovation, Tournamatic transmission operated by Bendix-Westinghouse in constant mesh by air compressor. The three Tournarockers in the 50-ton model all have electric controls, hoists and steering, dynamic braking called Electratarder and Tournaschneider torque converter."

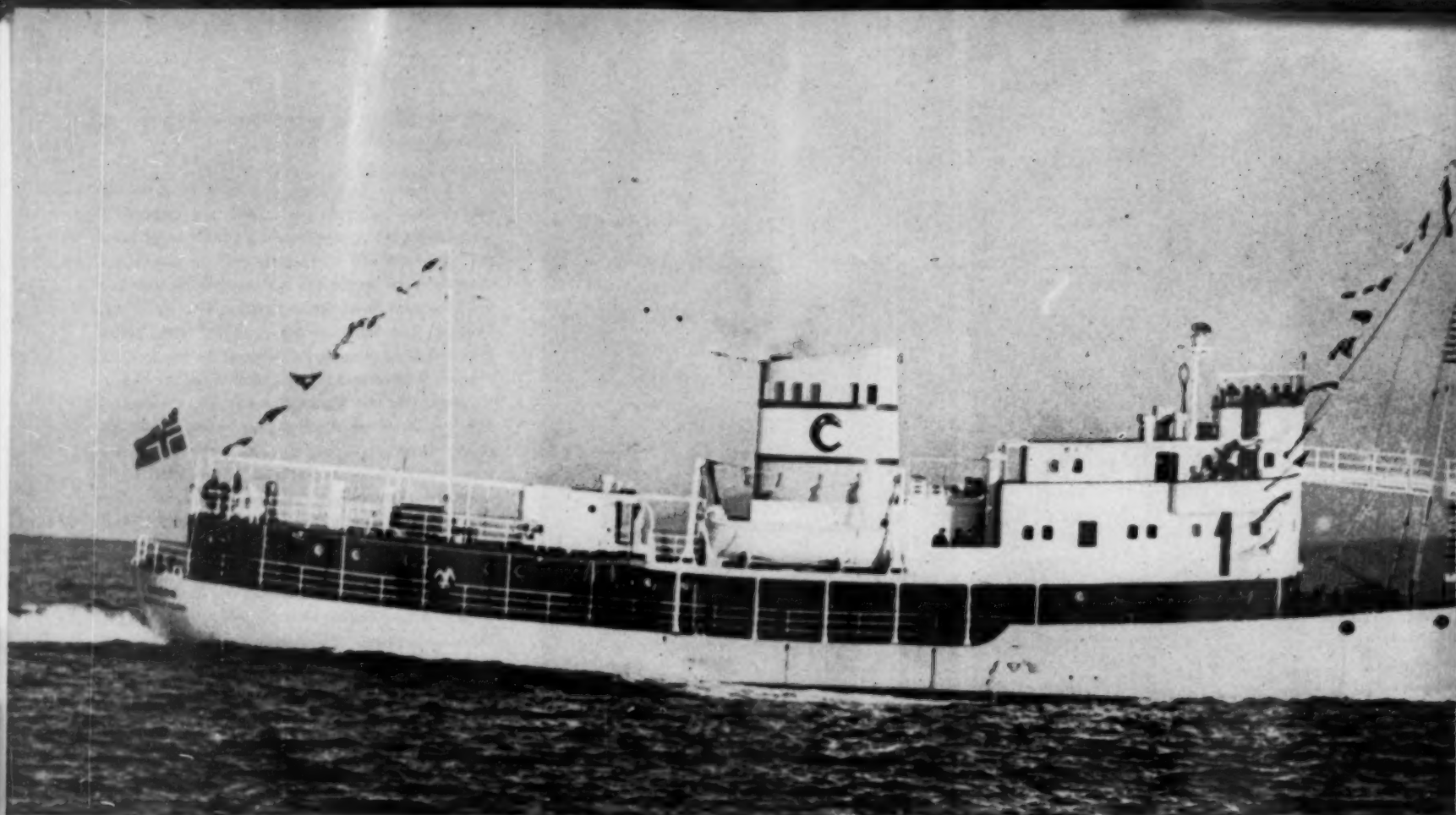
The mine shop was a busy scene and an opportunity to observe factory, dealer and consumer in friendly cooperative study of the problems of fitting into the mine operations the dieselized equipment for still better service in equipping and teaming up the skilled labor. No alibis by representatives of the equipment. They were here to get the facts as shown up by the mine operations, correct and pass along to the manufacturer any suggestions that would add to life and efficiency of LeTourneau, Buda and all the accessories hung on either. Dealer Olson also reflected a broad and patient approach to engine and equipment trouble shooting. And the tolerant and frank remarks on the equipment by mine mechanics and engineers showed they appreciated this high level advice and cooperation by factory through its engineers and dealers. They were joined here not only helping solve local and individual machine problems but advancing the whole field of equipment engineering via diesels throughout all heavy equipment fields where mobile machines are advancing to re-power and reduce costs to lift man to higher levels of living standards.

An International blade grader keeping the roads smooth and wide for the ore and overburden trucks.



One of the Buda super-diesels which power all the Dart trucks at Bagdad.





The whaler *Enern*, powered by a 2700 hp. Nordberg 2-cycle diesel, attained a speed in excess of 17 knots during trials.

THE WHALER "ENERN"

The World's Largest and Most Powerful Diesel-Engined Whaler Powered by a Two-Cycle Nordberg Rated at 2700 BHP. at 225 RPM.

By DOUGLAS SHEARING

IMPORTANT among world-wide shipbuilding developments during 1952 was the construction and commissioning of the *Enern*, the world's largest and most powerful diesel-engined whaler. This new vessel, built in Norway by A/S Moss Værft & Dokk for the well known whaling company A/S Thor Dahl, recently completed successful trials and is now participating in her owners' whaling expedition in the Antarctic. The results of the new vessel will be followed with a great deal of interest. In addition to the vessel's relatively high propulsion power—2,700 bhp. supplied by a Nordberg two-cycle diesel engine—it is the largest with variable pitch propeller that has been built in Norway. This modern marine engineering combination has given the *Enern* a speed of 16-17 knots.

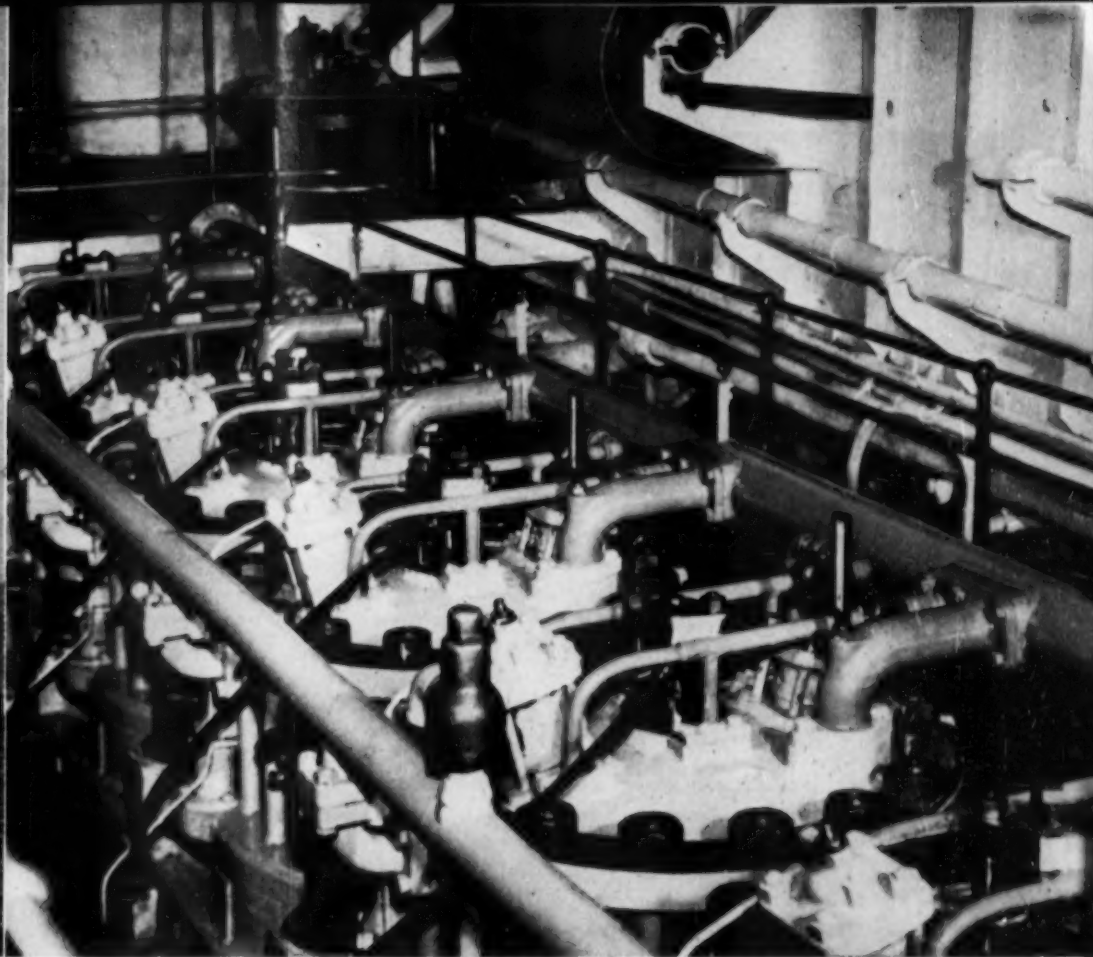
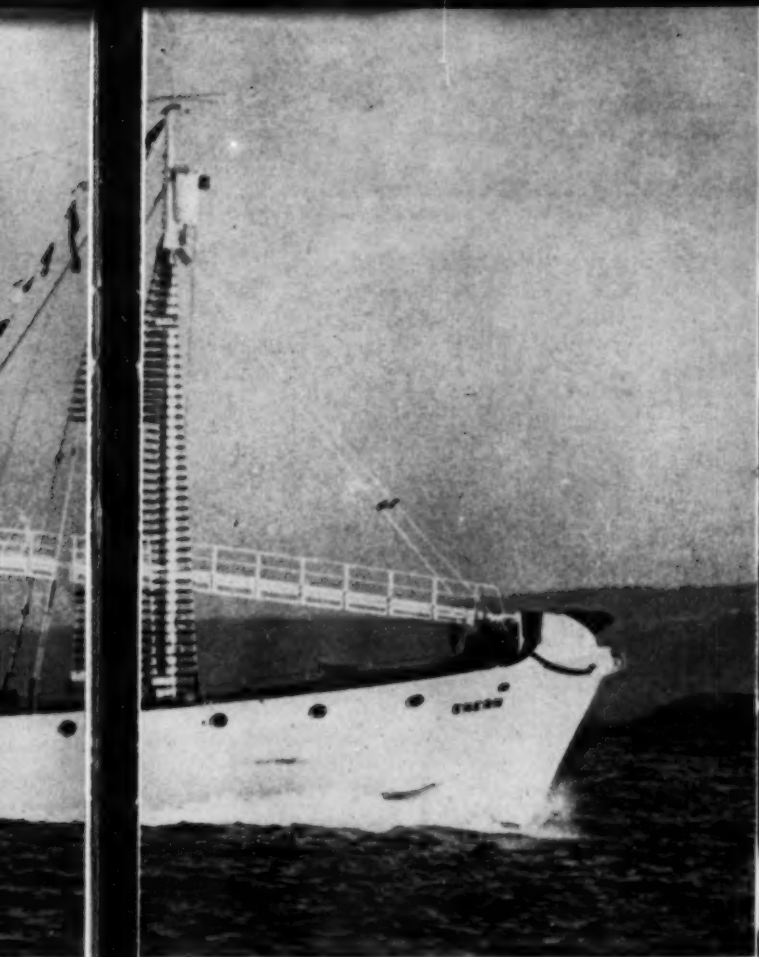
The *Enern*, of 908 tons gross, has an overall length of 210 ft. and between perpendiculars of 186 ft 6 in. with a beam of 33 ft. and an overall depth of 18 ft. 4 in. The vessel was built with a well raked stem

and cruiser stern and is double-bottomed forward of the deep tanks and for a short distance in the engine room. The double bottom tanks are used for fuel oil and fresh water. In addition, four tanks, two on each side of the shaft alley aft on the engine room are used for fuel oil and potable water. The large fuel oil storage capacity built into the *Enern* is significant in that it enables long voyages without bunkering. With its modern design, the vessel has been fitted with all instruments necessary for extended whaling expeditions including radar, echo sounder, etc.

The Nordberg engine supplying the propulsion power is of the two-cycle, trunk type with direct driven scavenging pump. The engine has six cylinders of 21½ in. bore and 31 in. stroke and is rated 2700 bhp. at 225 rpm. The variable pitch propeller is made of stainless steel and is hydraulically operated. Designed and built by A. M. Liaen, Alesund, Norway, it has a diameter of 10 ft. 6¾ in. and

weighs approximately 32,000 lbs. including regulating machinery and shaft. By means of control levers in the engine room, on the bridge or on the whale gunner's platform, the propeller blades can be adjusted to any pitch between maximum ahead and maximum astern. This feature assures excellent maneuverability.

The Nordberg engine has two hydraulic governors. One governor is fitted for controlling engine rpm. due to the use of a variable pitch propeller. Speed of this governor is regulated from the various control stations. The other governor is installed to protect the propulsion engine against overspeeding when the vessel pitches in heavy seas. A dial is provided for setting the maximum overspeed. This governor arrangement enables the *Enern* to maintain greater speed in bad weather without over-stressing the machinery. When designing the auxiliary equipment, special consideration was given to reliability in view of the conditions under which



Platform level view in engine room showing cylinder heads and top fuel injection equipment.

Engine room level showing operating side of the Nordberg diesel engine. Note Bosch fuel pumps and Manzel lubricators.

the vessel would be operating. All necessary auxiliary motors are installed in duplicate and electric power is furnished by two diesel engine-generators.

A smaller auxiliary generating set is also installed to provide electric power when the ship is at anchor. This includes power for an emergency air compressor.

All engines including the 2700 hp. main Nordberg propulsion unit have fresh water cooling and each have their own jacket water, heat exchangers, lube oil coolers and pumps. Pumps for the main engine are motor driven. A complete steam plant with an oil fired boiler, condenser and necessary auxiliaries has been installed for operating the whale winch and supplying steam for warm air heat and to the heating coils in the fuel tanks. Two starting air tanks for the diesel engines have been installed as has a smaller tank for air used in pumping up the whales. The *Enern* does not follow the conventional design of whalers inasmuch as an open bridge is employed rather than an enclosed pilot house and separate space has been given to navigational and radio rooms. Also, the master gyro-compass is placed down in the ship with the operating repeater compass on the bridge.

Accommodations on the vessel are spacious. The crews' quarters are below deck, aft, the engineering officers on main deck aft and deck officers and steward on the main deck forward of the engine room. Mess hall, wardroom and galley are also located in the forward deck house. Forward of the line locker, the entire space is used for provisions and stores with a cold storage room and refrigerating chamber in the center.



A CIVIL DEFENSE REQUIREMENT

THE AUTOMATIC TRANSFER SWITCH IN CIVIL DEFENSE

IN any defense program, the planner must presume that the enemy will destroy or damage the electric power plants that serve the community. Once this has occurred, the speed and efficiency with which emergency generating equipment takes over the job of supplying power will be an important factor in determining the total extent of damage done. During those first few panicky seconds after an atomic explosion, the reassuring effect of the auxiliary power source automatically taking up the load and providing continuity of light and power, could easily provide the difference between loss of life and destruction of property, and safety of personnel and equipment.

The Automatic Transfer Switch is urgently required in any setup where an electric plant is used. The Automatic Transfer Switch is the only certain means of getting the auxiliary plant under way in a disaster. Hoping that key personnel will be on hand to start the auxiliary plant during an emergency, may be gambling with human lives; if the people who know about your emergency set are unable to operate it, all your emergency provisions go by the board. The Automatic Transfer Switch eliminates guesswork; when this equipment is in the circuit, you know you'll have emergency power when you need it—if the Automatic Transfer Switch has been properly selected. By definition, an Automatic Transfer Switch (Figure A) is designed to transfer load from the normal (or preferred) power source to an emergency supply should normal voltage fail or be substantially reduced. Any equipment which will not perform this service under all conceivable conditions is not a true Automatic Transfer Switch despite any designation the manufacturer chooses to give it.

Since operation of the Automatic Transfer Switch

may be a life or death matter, properly designed transfer switches must be ruggedly dependable. In addition, they must incorporate several features not always provided in standard industrial control. These features include: 1. Continuous duty rating. 2. Actual double-throw construction with no maintained "Off" position. 3. Quiet operation. 4. Simple maintenance and inspection. 5. Full relay protection. 6. Double source control. 7. Signal contacts and lockout delays. 8. Minimum space requirements.

1. Continuous Duty Rating. In selecting your Automatic Transfer Switch, make sure that the one you choose is rated on a continuous rather than an 8 hour basis! Continuous duty is a requirement of service that demands operation at a substantially constant load for an indefinite time. On the other hand, contactors and most starting equipment are rated on an 8 hour basis. The 8 hour rating is defined by the National Electrical Manufacturers Association Standard 19-52 as follows: "The 8 hour rating of a magnetic contactor is a rating based on its ampere carrying capacity for 8 hours, starting with new, clean contact surfaces under conditions of free ventilation with full rated voltage on the operating coil and without causing any of the established limitations to be exceeded."

But Automatic Transfer Switches are frequently employed in applications calling for long sustained operation. The need for continuous operation on the emergency power source might be amplified by the chaotic conditions resulting from an atomic explosion. Make certain your Automatic Transfer Switch equipment will withstand continuous duty opened or enclosed with minimum maintenance. Failure of this equipment will create the hazard which it is intended to eliminate—complete service

outage. Transfer switches should be designed and rated to withstand incandescent lamp load inrush currents 10 to 20 times the normal full load ratings. Chart 1 compares continuous normal ratings for a lamp loaded with minimum and maximum inrush currents.

2. Actual double-throw construction with no maintained "off" position. Make sure the Automatic Transfer Switch you select is actually double-throw so that failure of a coil or control circuit does not maintain both normal and emergency contacts in the open position, i.e., with both sources disconnected from the load. The Maritime Commission states this requirement as "no off" position. A properly designed switch should keep the load on one source or the other at all times. There are three types of Automatic Transfer Switches offered by manufacturers today: 1. Double-throw, magnetically held. 2. Double-throw, mechanically held. 3. Two single-throw contactors and a relay.

Only types 1 and 2 are true double-throw switches. Type 1 is double-throw magnetically held in the normal position, and spring held in the emergency. On coil failure or loss of voltage across the coil, the operating spring opens the normal and closes the emergency. This type of double-throw construction provides mechanical and electrical interlocking with no maintained neutral or "off" position as inherent design features. However, due to design limitations, type 1 is available only up to 100 amperes at 250 volts; above 100 amperes it may be objectionably noisy on the normal position since it is magnetically held. Type 2 is double-throw electrically operated and mechanically held, but differs from type 1 in method of operation. However, the double-throw principle employed and the advantages inherent in the design are the same (Fig. B).

Fig. A—Typical Automatic Transfer Switch, 30 to 200 amp. size, non-inductive load, 250 V maximum.

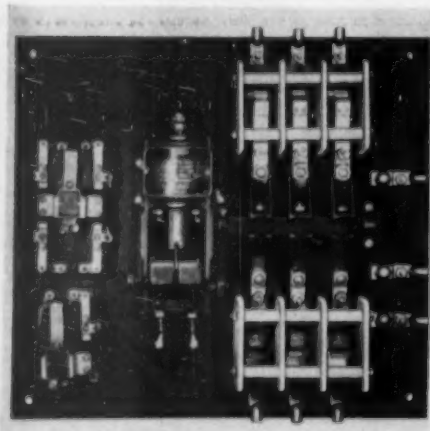
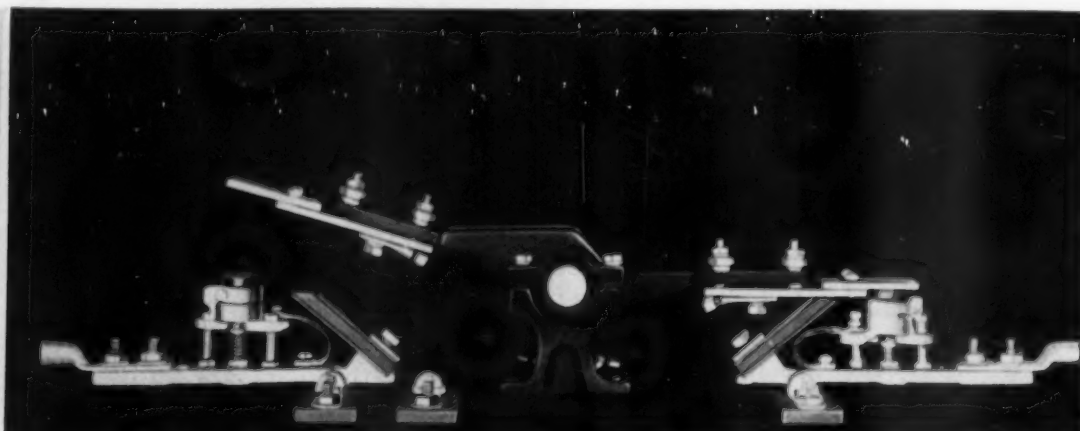


Fig. B—200 amp. contact construction, barriers omitted to show double throw construction. Note use of arcing contact separate from current carrying contact.



Certain fundamental design specifications are required in type 2 construction. Since the switch is in service continuously, the main solenoid operating coil should be energized only during the actual transfer. This minimizes coil failure and eliminates ac. hum and chatter, coil losses and possible residual magnetism. The power available for breaking the circuit must be sufficient to overcome any possible friction in the mechanism and open contacts which may have welded. The mechanical design should be such that high main contact pressure is provided. Auxiliary arcing contacts which finally break the circuit and remove the arc from the main contacts are an additional desirable feature. In the event a control relay coil fails, the switch should function as it would on a normal source failure and transfer the load to the standby source. This transfer calls immediate attention to the failure and enables maintenance men to replace the defective coil and thus insure proper operation of the Transfer Switch.

Type 3 Automatic Transfer Switches consist of two single throw contactors and a relay. These are not true double throw controls, since there are more than two possible positions. Several serious objections to this type of switching arrangement are at once evident. Two single-throw contactors have four possible positions: 1. Normal closed—emergency open. 2. Normal open—emergency closed. 3. Both closed. 4. Both open. Obviously for correct operation only positions 1 and 2 are acceptable.

Condition 3, (both closed) would drop out either or both services, and of course is not permissible. To prevent this condition from occurring a mechanical interlock must be used. Use of this device is disadvantageous for two reasons. First of all this interlock is removable and may not be in place when needed. Secondly, the limited contactor magnet stroke requires precise adjustment of the interlock rod. Electrical interlock contacts are usually added as an additional safety measure. But even with mechanical and electrical interlocks, flashovers have occurred causing both services to trip. These flashovers usually take place on return from emergency to normal. At this time presumably the emergency is at full voltage and opening the circuit under load causes the maximum arc at the emergency contact. If this arc is not extinguished before the normal is reconnected, both services may be paralleled and trip.

Condition 4 (both open) may occur because opening of the normal contactor does not unfailingly close the emergency contactor. It merely closes a contact allowing the emergency to close provided the relay has tripped. If the continuously energized normal contactor burns out, the relay holds the control circuit to the emergency contactor open, and although both services may be available, neither will feed the load. Control circuit failure or electrical interlock contact failure will likewise maintain a neutral position. The same objections apply to single-throw mechanically held units combined to make a so-called Automatic Transfer Switch, except that 4 to 6 coils, some interlock contacts, hooks or latches and complicated wiring are necessary. Failure or disarrangement may maintain

a neutral position, i.e., both units will remain open.

Any design which in itself creates an additional emergency condition or outage due to equipment failure, is basically inadequate and should be avoided. Properly designed Automatic Transfer Switches should have double-throw construction with only two possible positions, normal or emergency, and no maintained "off" or neutral position.

From practical field experience, any other design is a possible source of complete outage and therefore should not be acceptable. If failure of any coil or part may cause a neutral or "off" position, it will produce the identical condition of outage which the installation is designed to prevent, namely a hazard to life and property due to loss of power.

3. Quiet Operation. Another fundamental requirement is quiet operation. It is true that once the diesel is started, the noise created by the power unit is likely to overshadow any hum on the control panel. But while operating on normal power, there is no reason why personnel should be subjected to the nuisance of noisy panel. The mechanically held Transfer Switch has a momentarily energized coil, so most of the ac. hum and chatter is eliminated—only the low loss small relay coils are continuously energized.

4. Simple Maintenance. The design should be so simple and sturdy that the average mechanic can easily inspect and maintain the switch. For this reason, all Automatic Transfer Switches for emergency light and power should be limited to 250 volts for light and 440 volts for power. All control parts should be accessible from the front of the panel. Properly designed equipment should last indefinitely. Only low loss relays should be used, so that under normal conditions they will never require replacement. Automatic Transfer Switches should be tested periodically; a test button should be provided for this purpose.

5. Full Relay Protection. Automatic Transfer Switches should have full relay protection. This full relay protection should provide for transfer to the emergency source when voltage on the primary source falls below 70% of normal. Full relay protection providing for transfer at higher voltages must also be supplied for many applications. Utility engineers state that dips above 80% are often

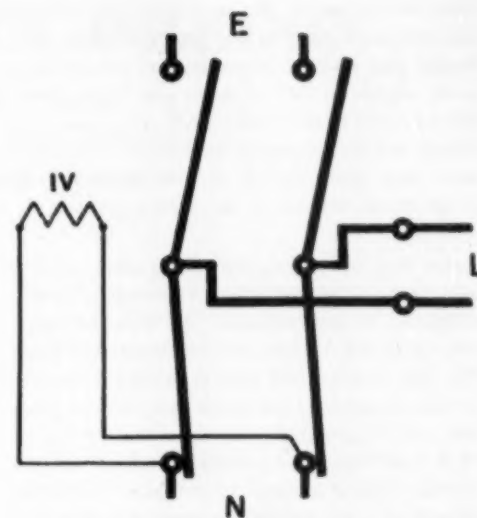
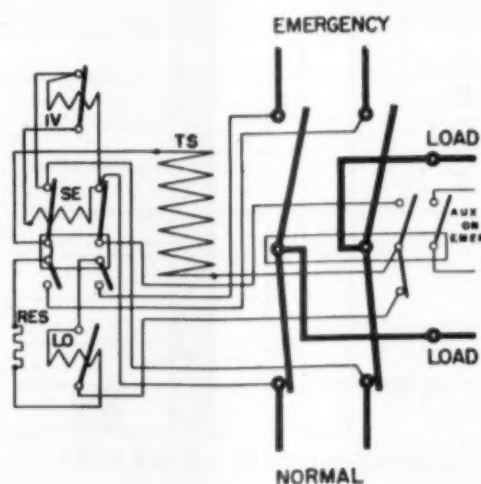


Fig. D—One voltage relay is used on 2-wire systems and one single phase on dc. 3-wire systems. Relay is connected across live lines.

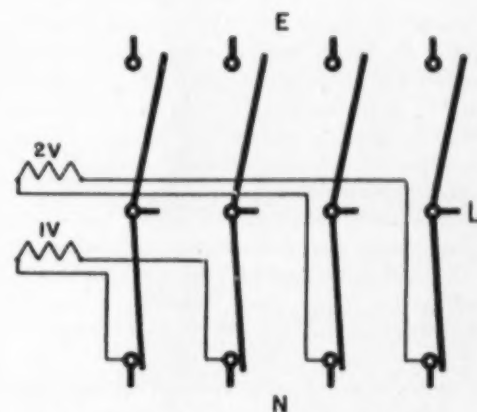


Fig. E—Two voltage relays are used on 2-phase, 4-wire systems. On 5-wire, 2-phase systems, four relays are used, each connected from neutral to phase.

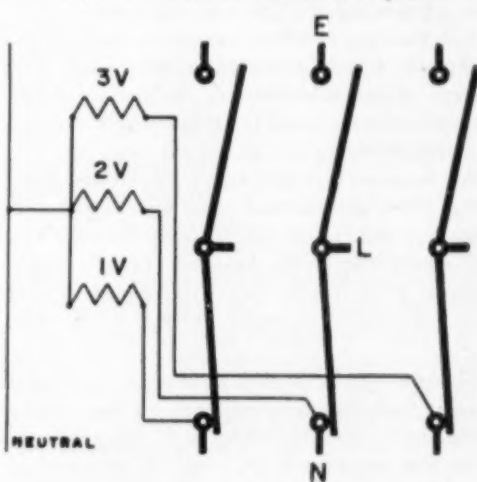


Fig. F—Three voltage relays are used on 3-phase, 3-wire or 3-phase, 4-wire systems. On 3-phase, 3-wire systems, relays are connected across phases. On 3-phase, 4-wire systems, relays are connected from neutral to phase.

transient, but below 70% are usually definite service failures. Return to the original supply line should take place when normal line voltages have been restored to 90% or more (see Figure C for typical circuit). In addition, full relay protection should provide against phase failure, or on three wire single phase and dc. sources against voltage drops below 70% across the outside wires.

Below 70% (85 volts on 120 volt lighting), no type of lighting is of any value. Fluorescent lighting drops out at approximately 102 volts and incandescent gives a red glow and negligible light below 85 volts. Without full relay protection, a drop in voltage or failure of one leg on three wire, or phase failure on four wire may not cause transfer. Figures D, E, and F show the position of voltage relays in various wiring systems. Proper relay protection should give 70% and 90% voltage pickup on each hot leg to neutral. Feeder failure protection which provides load transfer to emergency on complete feeder failure only is not acceptable on many applications. For example on a lighting circuit, a transfer may not be effected even though 2/3 of the lights may be out. Standard relays used on transfer panels drop out at approximately 33% and pick up at 80% of normal voltage (40 volts drop out and 96 volts pick up on an 120 volt coil). Relays should be designed to withstand continuous voltage at pick up potential to prevent overheating of coils on partial restoration of normal. On ac., inrush current may be maintained on a relay coil below pick up voltage, but even at 90% of pick up voltage, this inrush current should not damage the potential relay coils.

6. Double-Source Control. Another important fundamental requirement is that the Automatic Transfer Switch be operated from the source to which the load is to be connected. Transfer should be accomplished by the source selected by the relays, regardless of the continuity of any other source.

7. Signal contacts and lockout relays. A signal should indicate the position of the Automatic Transfer Switch, otherwise failure of a relay coil or a blown fuse may put load continuously on the standby source with no second source automatically available should the standby fail. For standby automatic engine generator sets, the engine starting control contacts should be on the Automatic Transfer equipment, so that the normal source relays on the Automatic Transfer Switch will initiate cranking. When the generator set is up to speed (frequency) and voltage and ready for the load, then a control relay on the Automatic Transfer Switch should cause transfer. This relay should respond to voltage and frequency, and not voltage only.

No set should be cranked or brought up to speed under load, causing undue strain on the cranking equipment, possible stalling, or at best a delay in reaching proper voltage. Until the generator is available to receive the load, the load should be locked on the normal source to utilize whatever normal service may be available.

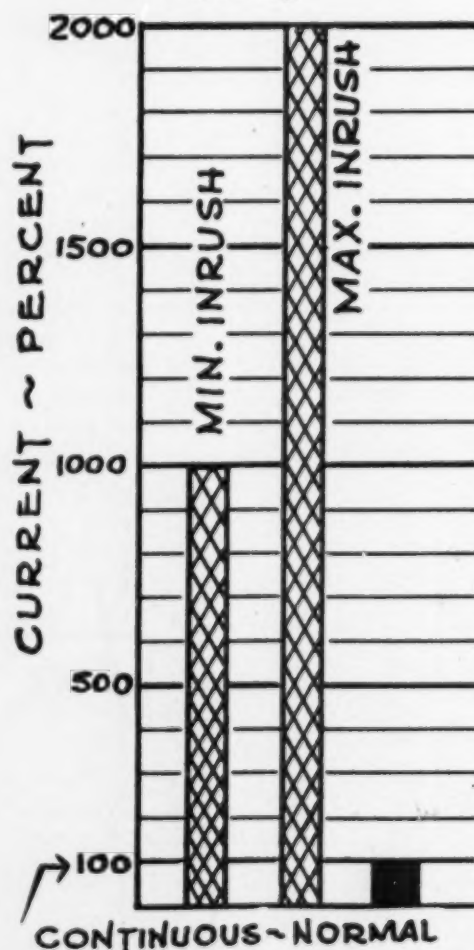
8. Minimum space requirements. Limited space frequently necessitates a small compact unit. On the other hand, maintenance men urge ample wir-

ing space for initial installation as well as for regular maintenance operations. Obviously, a suitable compromise between these two factors must be effected.

The "built-in" time delay feature is fast becoming an essential feature on transfer panels. The function of the time delay is to ignore harmless momentary power dips and outages on the normal power source. Normal power source distribution feeders from public utility companies are subject to occasional momentary dips and outages, caused mostly by faulty loads, accidental grounds and electrical storms. An Automatic Transfer Switch with a time delay relay connected in its supervisory wiring circuit ignores harmless power dips and outages, but transfers its load to the emergency source if an outage is sustained. Utility experience shows that when an electrical fault is sustained for more than one second, a complete outage is probable. On sustained outages, the time delay relay times out and allows the Automatic Transfer Switch to connect its load to the emergency power source. The recommended time delay relay setting for this application is 3 seconds maximum.

If the emergency power source connected to the Automatic Transfer Switch were an engine driven generator, the time delay relay would prevent unnecessary starting and stopping each time the normal power source dropped out momentarily. Whatever the emergency supply, the time delay

Chart 1—Power transfer switches should be designed and rated to withstand incandescent lamp load inrush currents 10 to 20 times normal full-load ratings.



relay should prevent restoration of the load to the normal power source until this source has been maintained at full rated voltage for 2 to 3 minutes. This length of time is assurance that the power source is clear of the fault that caused its failure.

In general, an electrically operated transfer switch is vastly superior to a contactor for automatic transfer purposes. Contactors open by spring and gravity. This opening power must be weak enough to be overcome by the closing magnet, which also has the work of closing the contacts. An electrically operated switch should be activated by a mechanism which operates positively in each direction. It should not depend on gravity to open the contacts. With such an electrically operated switch, contacts cannot weld closed; a surge of power opens and closes the switch.

Having determined that the transfer switch you are contemplating fits in with the above basic requirements, check the following additional points: 1. What is the operating speed? Transfer switches now on the market are capable of effecting transfer in 2 to 5 cycles on small units and 5 to 9 cycles on large. Hardly a flicker on a lamp load during transfer. 2. If mechanically locked it is held in position by powerful linkages, or by delicate hooks, latches or some permanent magnets. Naturally the stronger the holding mechanism, the less likely the switch is to jar loose in case of vibration or accidental striking of the panel. 3. Are the contactors forcibly opened so they cannot weld closed? Contactors opened by spring and gravity have no powerful opening mechanism. They may be frozen in one position when they are urgently needed. 4. Is the switch capable of withstanding 10 to 20 times inrush current of the gas filled tungsten lamp load? 5. Are auxiliary arcing contacts provided? These separate arcing tips open and close before the main contacts, adding months of extra low resistance life to the current carrying contacts.

If your transfer switch fits all the requirements mentioned, you may be assured that you have provided the maximum protection available. You have chosen a transfer switch capable of doing its part in the emergency conditions engendered by an enemy attack.

CHECK LIST FOR SELECTING YOUR AUTOMATIC TRANSFER SWITCH

Make certain that your transfer switch has the following basic characteristics: 1. Designed for continuous duty, not 8 hour operation. 2. Capacity to withstand incandescent lamp load inrush currents 10 to 20 times the normal full load ratings. 3. Mechanically constructed to have actual double-throw construction with no "off" position possible. 4. Quiet operation. 5. Easy maintenance and inspection. 6. Full relay protection. 7. Double source control. 8. Signal contacts and lockout relays. 9. Optimum amount of space.

In addition, the following features are of advantage: 10. Built-in time delay. 11. Rapid operating speed. 12. If mechanically locked, held in place by strong linkages. 13. Contacts forcibly opened. 14. Auxiliary arcing contacts.

BRITISH SMALL DIESELS IN OREGON

Petter, An ABOE Product, Winning Solid Place in Marine, Farm and Lumber Industries of Southwest Oregon Coastal Area; Easy Starting, Good Service

By F. HAL HIGGINS

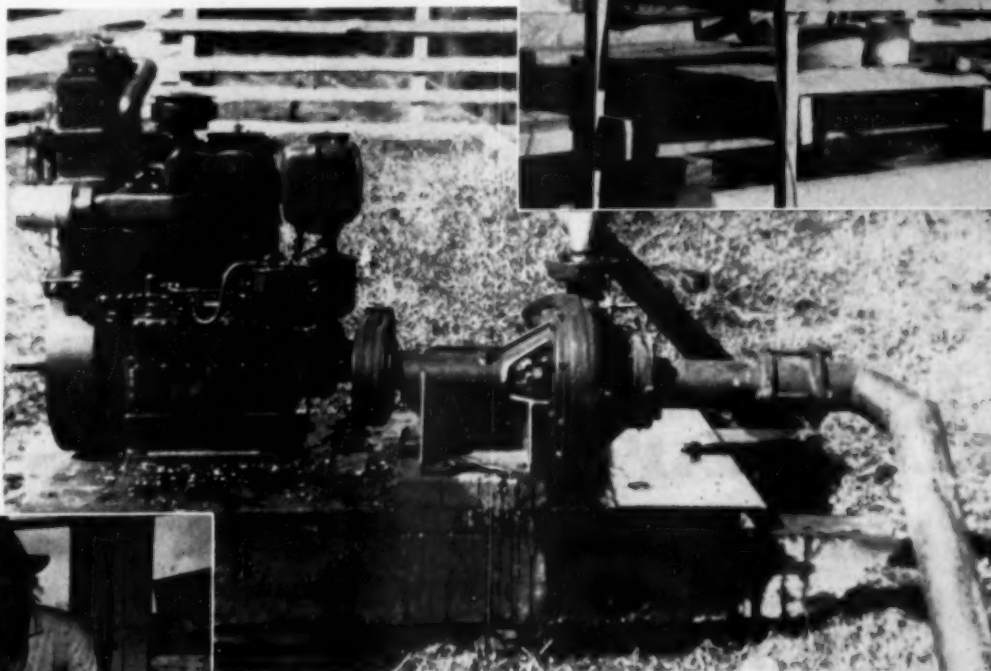
THE British are leading the way in bringing diesels to small stationary engine users in the famous old southwest Oregon coastal area. Bob's Magneto & Machine Shop at North Bend, on the edge of Coos Bay, is the dealer with a strip 125 miles along the Pacific from California's north border to Florence, Oregon. This dealership is one of 26 set up under the distributor at Seattle, Motor Parts Machine Co. It has, since the war, already sent out some 250 Petter diesel engines over the states of Oregon and Washington with sales and service through these 26 dealers. The sprinkler system of irrigation in the farming systems of the Northwest is the field that has taken most of these engines. The writer happened to glance up as he toured the oil distributing plants of the six leading producers on the West Coast in his visit to Coos Bay, and noticed the big sign on Bob's shop across the highway. He immediately went over to get acquainted and learn what was doing in this area for small diesels.

"It was the frequent valve failure of the old obsolete gas engines in my territory that decided me it was time to change over the small engine power to diesel. And it was a borrowed copy of DIESEL PROGRESS that got me in contact with the ABOE organization in New York after I had considered all the companies with small diesel engines. I took on both the ABOE Petter and another British engine at the start about 2½ years ago. The Petter

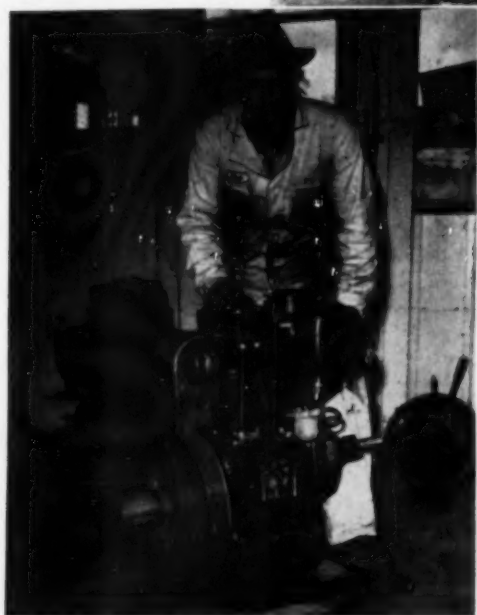
one place to another. The British diesel starts easy, even in cold weather, which is always a surprise to the buyers when they see me start one here with a twist of the crank. I have sold none with electric starters.

"Many of my sales have been change-overs from gasoline power. Both farmers and fishermen as well as lumber mill owners in this area are finding oper-

A sawmill installation of a Petter diesel in southwest Oregon where logging and lumbering in all its phases occupies nearly 90% of the working population.



Robert Bernhardt of "Bob's" with a Petter on his special steel sled for easy moving and stable work base.

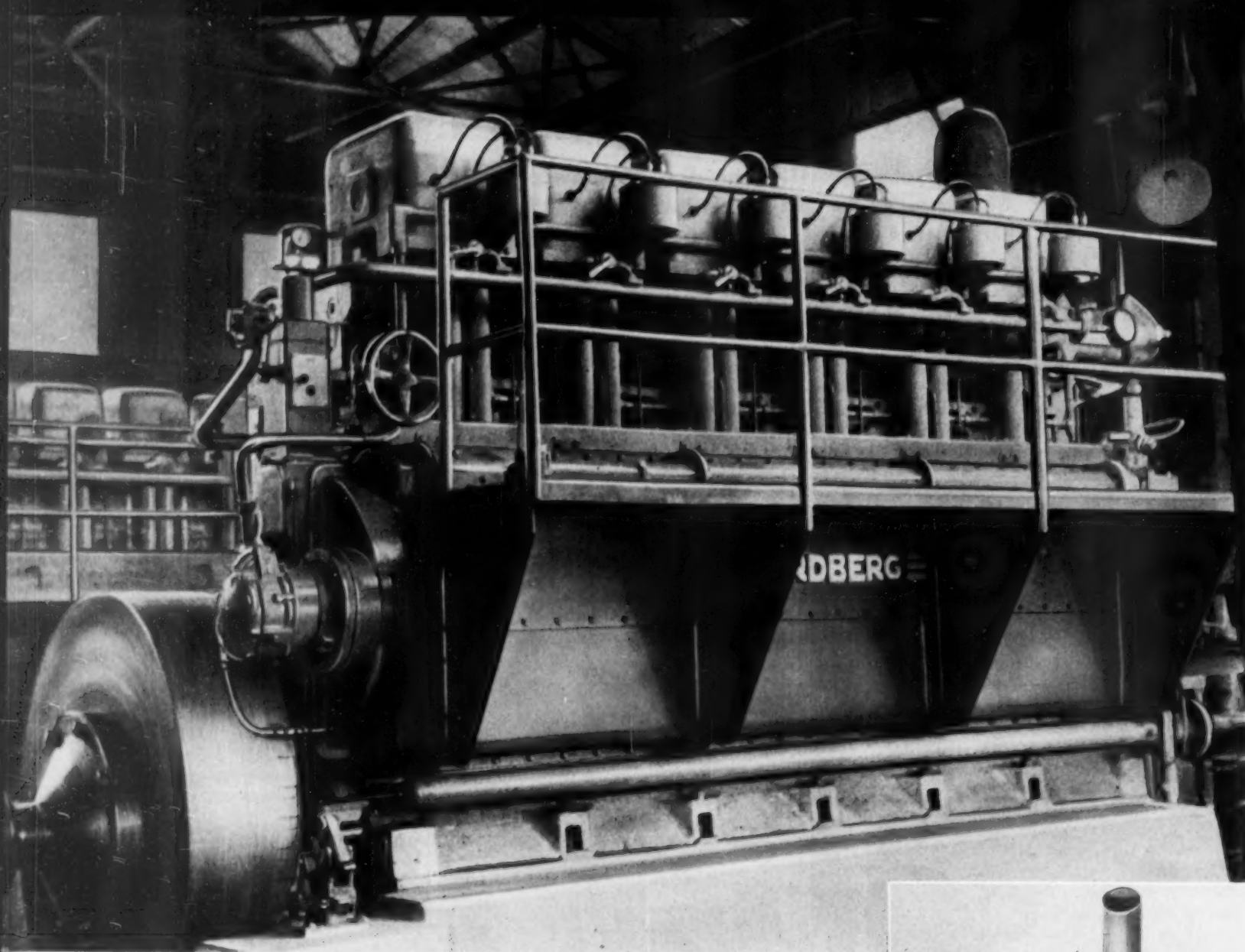


A Petter diesel on a Fairbanks-Morse pump powering a sprinkler irrigation system in Southwest Oregon.

has proved the big seller. Of the 22 installations now out, 19 are Petter. My decision has proved good, as I have had no trouble other than minor adjustments. I find ABOE knows the value of a big stock of parts to take care of any and all demands for such service, and I can fill such demands from my stock and keep my parts bins full and ready to meet any call on the minute.

"The main problem I find with selling to users of the old gas engines is to get them to set them on better bases than the gas engines usually have. Hence, I have developed this steel sled you can see under that Petter on the floor. It permits easy moving by hand on the floor or by tractor or jeep from

ating on the old gasoline engines too costly when they figure high prices and taxes on gasoline and note what the thousands of heavy trucks and tractors are burning in woods, on the farm, in boats and transportation. The hazards of fire in the long dry summer months, as well as 'leakage' from stored gasoline to automobiles in the hands of workers and neighbors is also a factor. The loss of diesel fuel for autos is nil. Of my first 22 sales of Petter engines, 7 were change-overs from gasoline. The 19 Petters sold and serviced by me are AV1, AV2 and AVA1 models. Two went into fishing boats, eight into sprinkler irrigation for pumping, one to a dairy farm for light and power, and nine into small saw mills."



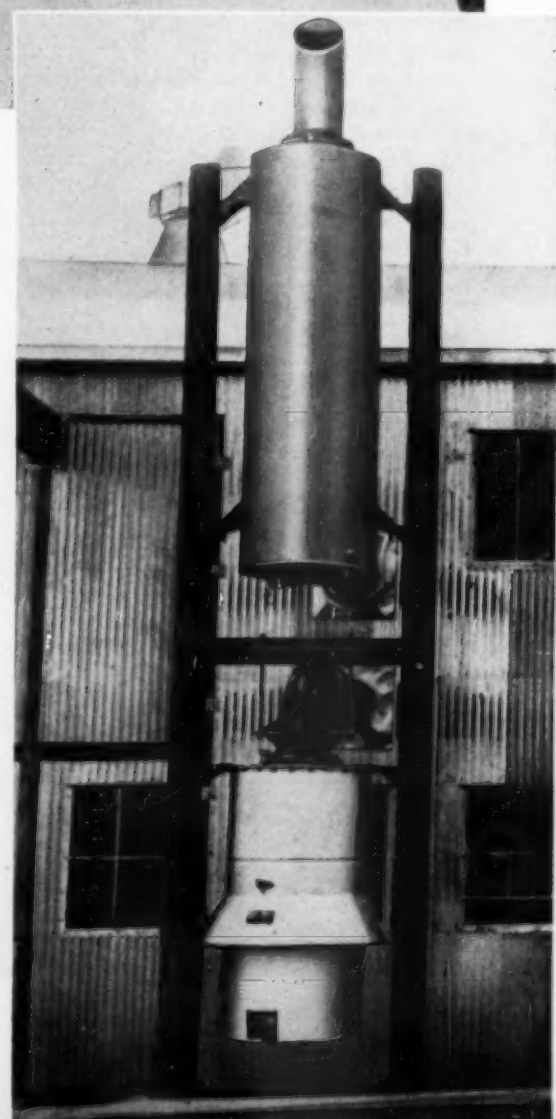
The Nordberg 4-cycle Supairthermal spark-fired engines on Phillips Pipe Line Company's 289 mile crude oil carrier are rated 935 hp. at 475 rpm. If conditions warrant, the rating could be increased to 1265 hp.

PHILLIPS INCREASES PIPELINE CAPACITY

TO increase capacity of its existing 12 in. crude line running from Odessa to Phillips Petroleum Company's Borger, Texas, refinery, Phillips Pipe Line Company is currently installing ten Nordberg four-cycle Supairthermal Spark-Fired gas engines for pumping service. This project, when completed, will increase capacity 23,000 barrels a day. This 289 mile pipe line was originally built in 1948 to transport crude from the West Texas fields to Borger refinery. Phillips Pipe Line Company also operates a products line, originating at Borger, Texas, with terminals at Kansas City, Kansas, East St. Louis, Illinois, and East Chicago, Indiana, with the division point at the Paola, Kansas station. Nine Nordberg engines were installed on this carrier in 1952 to boost capacity to 82,000 barrels a day. These engines were originally of the supercharged Duafuel type rated 1210 hp. at 460 rpm. All engines are now being converted for spark-fired gas service and seven will operate on the Supairthermal principle.

The crude line expansion by Phillips has been thoroughly integrated with the existing facilities to assure maximum pumping capacity and flexibility of operation and is hydraulically balanced through proper station spacing, line diameters and natural gradients. Maximum throughput is attained by uniform loading of the pumping units. The new Nordberg engines will operate in pairs and are located at Odessa, Gaines, Slaughter, Olton and Canyon. From the latter, the line carries directly to the Borger refinery. The Odessa station, located outside Odessa, started pumping in mid-February and the Gaines Station in early March. All engines will be in service shortly.

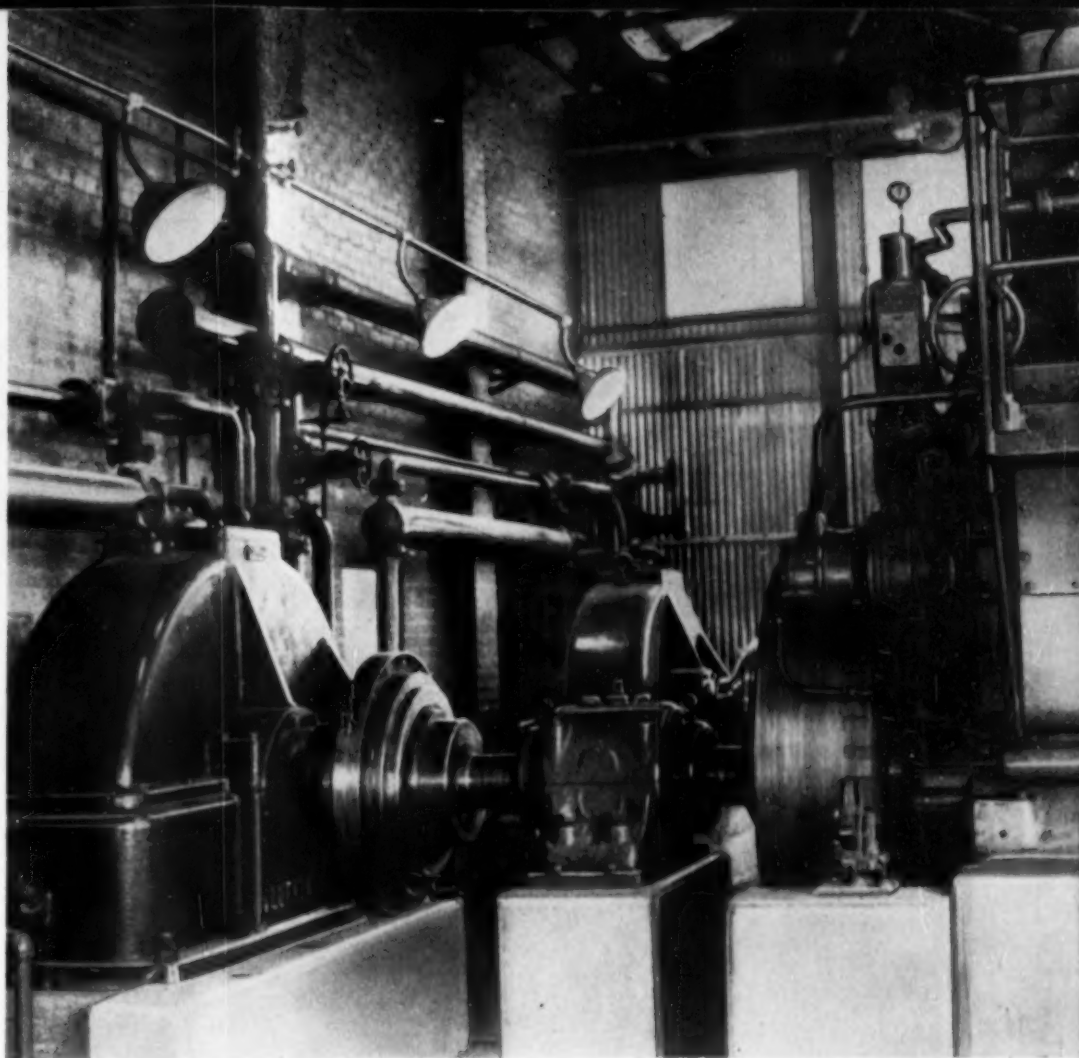
The Odessa Station is representative of the type of station setup employed by Phillips. Each of the Nordberg engines drives United Iron Works two-stage centrifugal pumps through 7.57:1 Lufkin speed increasers. These Nordberg engines are of the four-cycle type with six cylinders of 13 in. bore and



16½ in. stroke. They are rated 935 hp. at 475 rpm. at altitude and embody the patented Nordberg Supairthermal principle of variable inlet valve timing. These engines use the Bosch low-tension impulse generator with rectifiers and transformers at each cylinder. This ignition system has no distributor, breaker points, nor wearing parts excepting two bearings supporting the rotor of the generator.

The precise timing of the inlet valve on these spark-fired gas engines gives the correct air-fuel mixture from half to full load assuring uniform combustion and smooth economical operation. Also it automatically reduces the effective compression ratio of the engine while maintaining a constant, high expansion ratio. The high expansion ratio employed results in high thermal efficiencies—in excess of 41 per cent at full load. It also lowers the exhaust temperatures giving longer valve life and lower thermal expansion of exhaust header and piping.

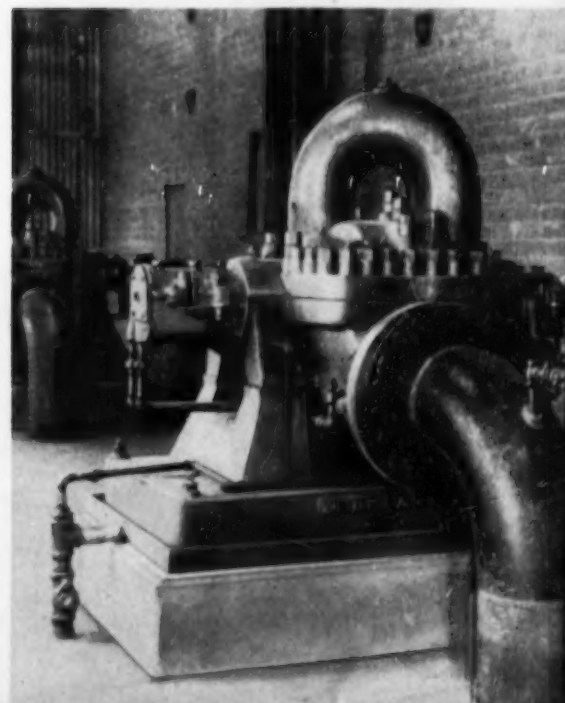
The crude throughput is utilized as the heat exchanger cooling medium for dissipating the heat absorbed by the jacket water, lube oil and intercooler. The exchanger is installed on the suction side of the centrifugal pump and cools a portion of the water from the engine to a temperature of 100°F., at which temperature it is passed to the intercooler. The intercooler, of the fin tube, two-pass type, reduces the intake air temperature following its passage through the turbocharger. The use of this type of after cooling medium is responsible for 10% of the Supairthermal's possible



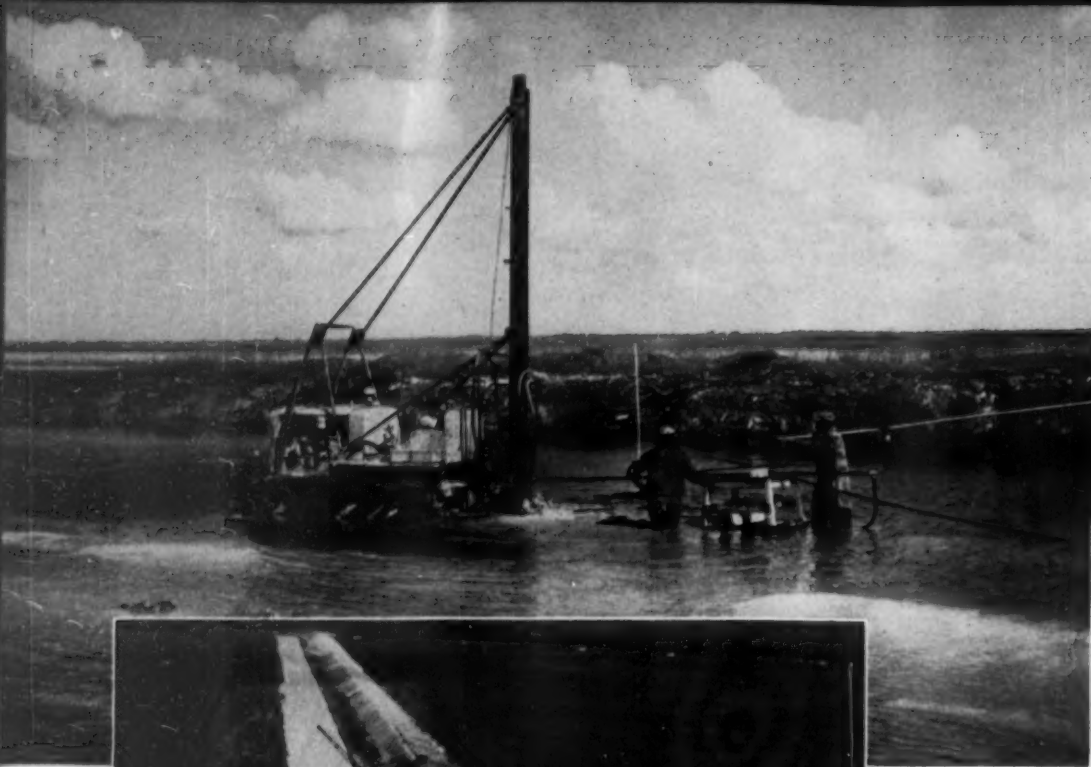
Drive end of one of the 935 hp. Nordberg Supairthermal spark-fired gas engines at Phillip's Odessa, Texas station. The 7.57:1 Lufkin speed increaser is at left.

33⅓% bmeq. increase over conventionally turbo-charged engines. Should conditions warrant, the horsepower of these engines could be increased to 1265 hp. at 475 rpm. (sea level) with minor timing adjustments and colder cooling water, approximately 90°F., to the engine intercooler. This reserve power permits increasing line capacity in the future without large capital expenditures.

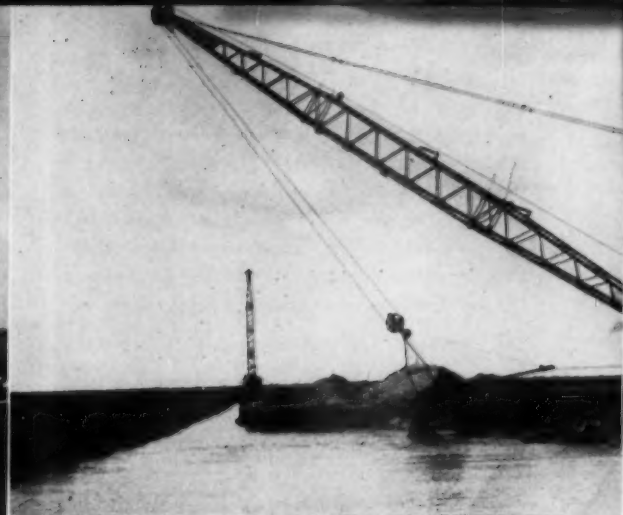
Two United Iron Works 2-stage centrifugal pipe line pumps at the Odessa Station.



Exterior of Phillip's Odessa pumps station showing American Air intake filters and Burgess-Manning exhaust mufflers for the two Nordberg engines.



A D6 Caterpillar with drilling rig drilling holes for dynamite charges which will loosen the rock formation under the soft muck.



DIESELS are helping to open up one of America's last frontiers. In the southern-most reaches of the United States is an area known as the Everglades that, according to the economist Roger Babson, "can feed the nation if it can be controlled," where also a head of cattle can be raised on less than 2 acres of land as compared to 80 needed in Texas. This, then, is where the Corps of Engineers, U. S. Army, is tackling the largest earth moving job ever attempted in the United States and second only to the Panama Canal. Some sections of this vast sub-tropical area have never been seen by white man except from the air.

Building the levees is a massive and stupendous job. Heavy machinery would have bogged down in the Everglades muck except for the use of heavy timber mats, wide tread tractor equipment, the continual pumping of water and the use of air-boats to haul supplies. Water control in Florida is so vital that the experts put it first on the States problems in Congress and prompted Senator Holland to say: "It is one of the gravest problems confronting the legislature."

Flood control work in Florida really dates back to 1881 when some construction was begun under an agreement between the state and private interests. The Everglades Drainage District began work in 1907 on more than 400 miles of canals; so this new project was nothing new to the Army Engineers who had successfully erected dikes around Lake Okeechobee (second largest lake wholly in the U. S.) in the 1930's. These dikes and levees were built after the tremendous losses of life and property around the Lake in 1926 and 1928.

Construction of the project began in Jan. 1950 with the raising of the levees around Lake Okeechobee to form a storage basin. At the same time the construction of dikes and dams, locks and pumping stations began so that flood waters can be restrained during the rainy season and then released when needed during the dry season or during periods of drought, thus assuring the whole area of a water supply under control at all times and adequate for all sectional needs.

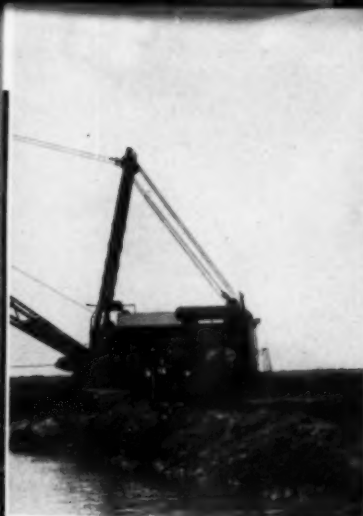
The first of these pumping stations will be S-5A, located on the Eastern edge of the Everglades about 18 miles west of West Palm Beach adjacent to the West Palm Beach canal, and is expected to be started in 1953 with the installation of three model 38D 8 1/8 x 10, ten cylinder opposed piston type Fairbanks-Morse diesel engines each rated at 1470 hp. at 720 rpm., hooked up to 3 Fairbanks-Morse



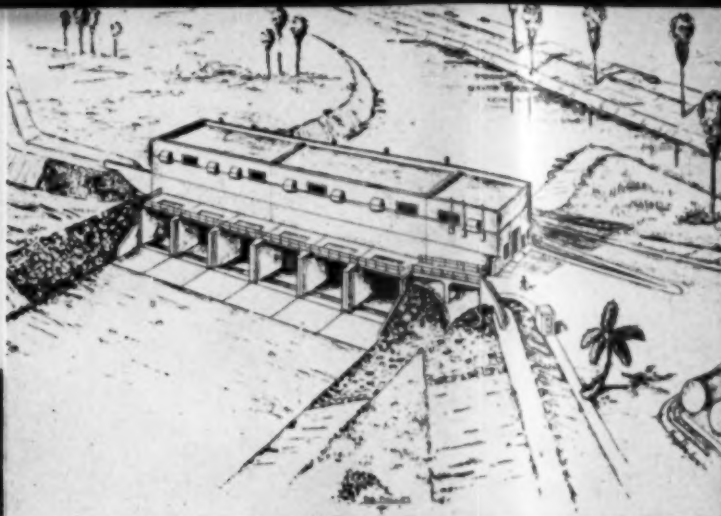
Building a 13 mile section of flood control levee and canal. Canal will be 75 feet wide and 14 feet deep.

Two Gardner-Denver 500 air compressors powered by two D1300 Caterpillars provide blast hole power on this section of canal.





A Manitowoc 6-yd. dragline on one of the many canals. It has a 120 ft. boom.



Artist's sketch of pumping station 55A 18 miles west of West Palm Beach. It will house six 1470 hp. Fairbanks-Morse diesels and pumps.

DIESELS IN THE EVERGLADES

By ED DENNIS

horizontal axial flow propeller type pumps rated at 360,000 gallons per minute each.

This station, one of the largest drainage pumping stations in the United States, will be 175 ft. long, 44 ft. wide and 27 ft. high and will ultimately house six of these pumping units with a combined pumping capacity of over 3 million gallons of water per minute, is expected to be completed the latter part of 1954. The number of pumping stations for the overall project, authorized and not yet authorized by Congress, will be ten and the anticipated number of diesel engines to be used is 64 with a total diesel horsepower of 44,430.

The next step was the building of levees and canals around the eastern perimeter of the conservation areas to protect coastal and resort cities and the erection of control structures to prevent over drainage and salt water encroachment. Work now is continuing along the lower southeastern agricultural areas and eventually will head north towards Lake Okeechobee. When this section has been completed, work will move up to the Kissimmee and Upper St. John's River basins. Since the Kissimmee River is the principal tributary into Lake Okeechobee, it is natural to assume that the channel will have to be deepened and the banks raised to accommodate additional waters. The plan also envisions use of the chain of lakes which serve as the river's headwaters, as a series of storage reservoirs. The levees around Lake Okeechobee were built mostly of marl and rock excavated from beneath peat soils and most of them are 70 or more feet wide. To combat wave erosion, the inner walls of the levee around the lake will be surfaced with macadam. In the areas of St. Lucie River, North Fork, Lake Istokopoga, Fisheating Creek and Moore Haven-Newhall, plans call for the improvement and extension of existing facilities to bring about increased run-off and to protect developed lands from flooding from adjoining areas.

The second pumping station of the system will be built by Ivy H. Smith Co., Jacksonville and will be #13 on Canal 11 in Broward County, about 300 feet west of U. S. Highway 441 and five and one-half miles southwest of the main business section of the City of Fort Lauderdale. The pumping station will have three General Motors diesels model 110 with 54 inch Fairbanks-Morse model 6310 vertical pumps that will have a capacity of 180 cfs. at 4.0 static head.

Knowing that two of the levees would merge at Tamiami Trail, a highway which runs a distance of approximately 260 miles from Miami on the East Coast to Tampa on the West Coast, the problem of raising the "Trail" presented itself. The procedure is simple to write about but colossal to view. In the beginning a by-pass had to be constructed and this was accomplished 135 ft. south of the existing road and ran for 2700 ft. in a semi-circle. They made a 10 ft. brim on the north side of the by-pass and made it 40 ft. wide to conform with the existing road. Borrow pits at the side of the by-pass were established by blasting holes 7 ft. of center with 48 sticks of one inch dynamite for each hole. After the shooting and when the dust had cleared, two Lima draglines, one powered with a Caterpillar and the other with a General Motors 6-71 diesel, were brought in to stockpile the coral rock and sand. The "pile" was allowed to dry for several days and then two D8 Caterpillar tractors were used to level it all off.

Another "borrow pit," 100 feet wide and 600 feet long was decided upon and after moving trees and debris it was excavated to a depth of 5 feet and the muck so obtained was reserved for later use in the landscaping. Large rocks and loose sand were also stockpiled to be used to fill in the pit when its usefulness was finished. At the five foot depth, holes were drilled 5 feet of center and 20 feet below the top level of rock and each was packed with 67 one

inch sticks of dynamite. After the big blow the Lorraine dragline (Cat 8400) was teamed with a fleet of Mack trucks to stockpile the "mess" along the side of the "Trail." These tough and rugged trucks are powered with Mack-Lanova diesel engines.

While all this was going on the "Trail" was being scarified and prepared to reach its new level. After a few weeks of "drying out" the stock piles were spread evenly along the road bed and graded and then given the finishing touches.

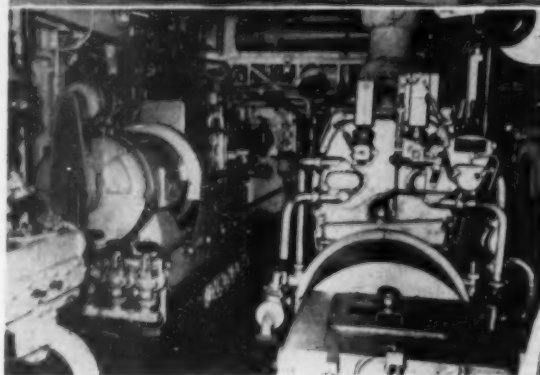
The Gahagan Construction Co. of New York on receiving a \$2,268,000 contract, had to use their

"Yankee ingenuity" and build a 90 x 25 ft. flexible barge with plenty of give. This unique barge, made of aluminum with a thin steel skin, is fully equipped for drilling and dynamiting, weighs but 34 tons and only draws seven inches of water. It was designed to speed the building of a 16 mile section of the levees and canals from State road 80, midway between Belle Glade and West Palm Beach to Hillsboro Canal. The shipyard where it was built was a patch of shifty black muck deep in the heart of the "Glades," the ways were made of fifty steel oil drums and twelve greased utility poles.

Twelve inch, steel "H" beams about 20 ft. long, have been driven into the earth at intervals of about 5,000 feet, the inch and a half steel cable on the barge will be attached to one of these "dead-men," then the 2 drum hoist, powered with a diesel engine, will draw the barge forward with the cable. From the 90 ft. rear end of the barge, drillers using two 600 cf. Ingersoll-Rand air compressors, will penetrate the rock beneath the "glades" muck and place charges of dynamite. After the rock has been loosened by the dynamite charges, the dredge Morgan, powered with an 1800 hp., 10 cyl. Fairbank-Morse diesel engine, will dig and suck up the spoils with her 24 inch discharge pipeline to build the levees on the banks of the canal.

The area directly influenced by the Central and South Florida Flood Control Project is 15,000 square miles and is larger than Connecticut, Delaware and New Jersey combined. It includes one-fourth of the state of Florida, one-third of its population and nearly one-half of its wealth.

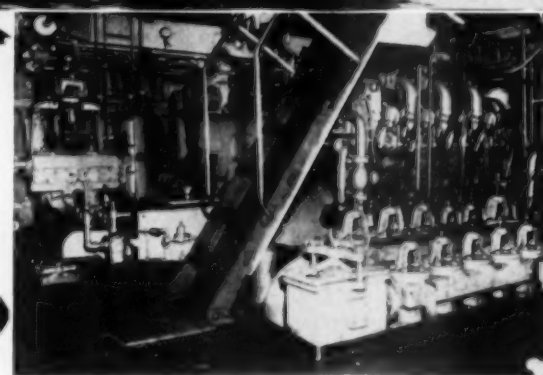
As this article is being prepared for publication, an oil well being drilled by the Coastal Oil Company on the shores of Lake Okeechobee showed signs of oil and gas at only 3800 feet and is causing considerable excitement among petroleum engineers.



The *Caltex Pakanbaru*, powered by two GM Cleveland diesels, each developing 800 bhp. at 750 rpm.

Engine room view showing the two Cleveland main propulsion engines, Model 8-278A.

View of the diesel engines showing the Marquette governors, Falk gear box and Ross heat exchangers at the rear.



RIVER TANKER "CALTEX PAKANBARU"

EXPLORATION for oil was started in Sumatra in 1935. Up to the time of World War II, 15 wells had been drilled and a drilling site cleared in Minas, but the entire project had to be suspended until after the cessation of hostilities. In January 1949 drilling operations were resumed. The crude oil must be transported from Parawang Oil Terminal on the Siak River to the deep-water terminal at Pakning on the Benkalis Strait. The distance between these two points is 80 miles and it would be difficult to construct and maintain pipe lines because of the swampy land. Furthermore, the Siak River is tidal and narrow, therefore large ocean-going tankers have too much draft to load at the Parawang Oil Terminal.

It was necessary, then, to design and build a shallow draft tanker which could transport the oil from these two terminal points. The *Caltex Pakanbaru*, a shallow draft, GM dieselized tanker, was designed by the marine technical staff of Caltex under the supervision of Andrew Neilson, a director of California Texas Oil Company, Limited. The ship was built at the John Cockerill Shipyard in Belgium.

This river tanker is of less than 3,000 tons deadweight and is registered under Nederlandsche Pacific Tankvaart Mij. After sea-trials in Belgium, the *Caltex Pakanbaru* went to Rotterdam, Holland, where she was registered under the Dutch flag. Then on February 1, 1952, *Caltex Pakanbaru* left

for Singapore via the Suez Canal. She made an excellent voyage, despite heavy weather en route, and covered the distance of 8,322 nautical miles in less than 36 days, arriving on March 8th.

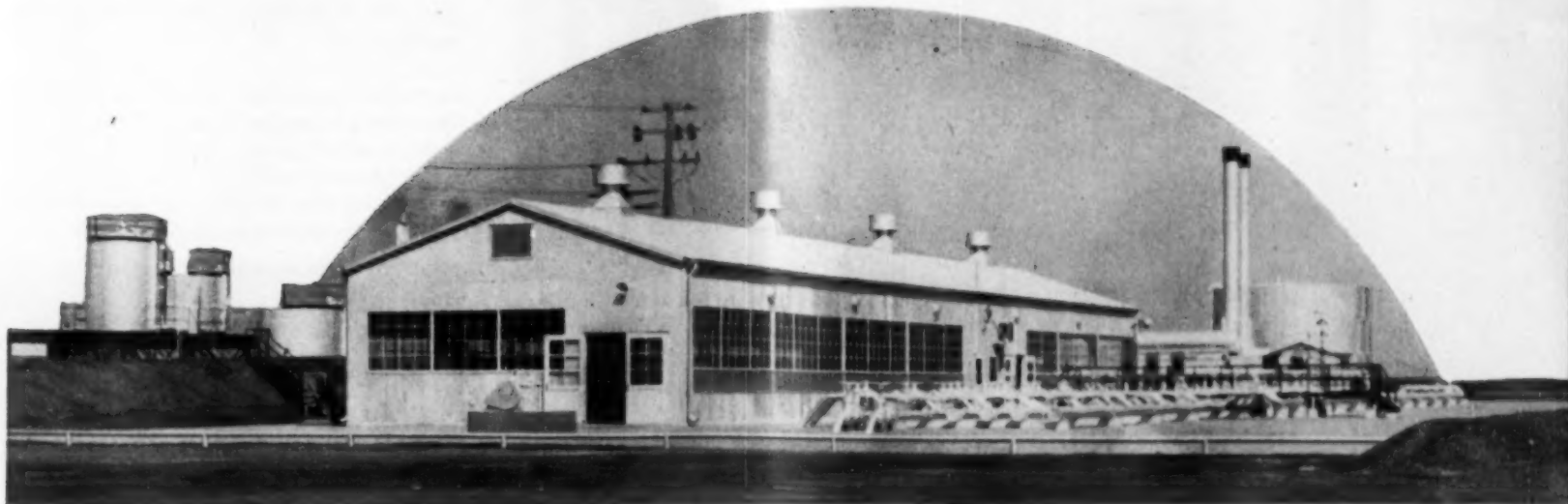
The vessel is propelled by two eight-cylinder, two-cycle, V-type General Motors Cleveland Diesel Division Model 8-278A engines which develop 800 bhp. each at 750 rpm. The engines are geared down 3 to 1 and drive the propeller shafts through air clutches, turning twin three-bladed, 8-foot diameter by 4-foot, 9 $\frac{3}{4}$ -inch pitch propellers at 250 rpm., giving the ship a loaded speed of 11 knots. Daily fuel consumption with the cargo tanks fully loaded, and at normal operating speed, is at the rate of 7.0 long tons per 24-hour day, so she is very economical.

Hull specifications of the vessel are:

Loaded displacement	4,185 long tons
Light displacement	1,212 long tons
Deadweight capacity at 16 $\frac{7}{8}$ " draft	2,973 long tons
Net cargo capacity	24,436 bbl.
Cargo tank capacity	133,500 cu. in.
Length OA	260 ft.
Breadth, extreme	45 ft.
Depth, MD	20 ft. 6 in.
Draft, loaded	16 ft. 7 $\frac{3}{4}$ in.
Draft, light	5 ft. 6 $\frac{3}{4}$ in.
Shaft horsepower	1,600

The vessel's twin rudders are actuated by an hydro-electric steering gear, and the twin propellers provide excellent maneuvering qualities, which are important in a narrow river. For auxiliary purposes, there are 150-hp. diesel generator units, which handle ship's services, and two diesel engines of 200 bhp. each for driving twin rotary cargo pumps. In addition, there is one Scotch-type boiler, having a capacity of 6,000 lbs. of saturated steam per hour, for heating the cargo in order that the oil may be pumped more freely from the bunkers. The engine room occupies a length of 21 frame spaces, each two feet by the width of the after end of the hull. Because of low fuel consumption and short trips, the fuel tanks have a capacity of only 45 tons. This small quantity permits an increase in the amount of liquid cargo which can be carried to the deep-water terminal on each trip. On the long maiden voyage, the cargo tanks were used for carrying fuel. Boiler and drinking water tanks hold 50 long tons, while the lube oil tank has a capacity of one and one-half tons. Modern navigation equipment has been provided, including ship-to-shore and ship-to-ship radio telephone of very high frequency, as well as radar. Searchlights also are provided to assist in night navigation.

As more oil fields are developed in Sumatra by Caltex Pacific Petroleum Maatschappij, undoubtedly more tankers will be built for the transportation of oil to deep-water terminals.



View of Union Oil's Junction Station.

UNION OIL'S JUNCTION STATION

By JAMES JOSEPH

SIX Enterprise DSM-6 diesels, astride Union Oil Co. of Calif.'s northern division pipe line, are being crude-fueled from the lines they monitor. This is Union's second and largest crude-fueled diesel installation, and it replaces a 42-year-old steam-powered pump station. Diesel engines have long thrived on a variety of fuels—from diesel oil to sewage gases. But the 16-degree API crude oil, one product pumped by the northern division line, had been thought undigestible. Yet the Enterprises have taken to the heavy, pre-warmed stuff as an infant to Pablum. Their penchant for heavy crude right out of the pipe line has had happy effects cost-wise.

Eliminated is a long and expensive truck haul. Moreover, using line crude, Union cuts its diesel fuel bill at least \$3.50 a barrel since mainline crude is priced at about \$1.80 a barrel compared to \$5.20 a barrel for standard diesel fuel oil. With consumption averaging some 12 bbls/day during present operations, this represents a \$42 a day fuel savings. Crude-fueled diesels are but a few of the features incorporated in Union's new Junction Pump Station, its third and largest steam-to-diesel conversion on the northern division line. Some others: (1) easier to handle, above-ground manifolding; (2) centralized console monitoring; (3) intra-station piping concealed in steel-plate-covered trenches; (4) air clutching between diesel engines and quintuplex pumps; (5) built-in fire protection because of the station's isolation; (6) special filtration system for crude that's to be used as diesel fuel.

But let's put the Junction Station in its proper setting. The Taft-Coalinga area is a flat, wind-stricken, sizzling one-time desert which is now fast-blooming thanks to irrigation. The station—whose main job is storage and transmission rather than boosting—receives crude through two 8-inch lines incoming from the south, and from another 8-inch from the north. The southern inflow arrives from oil fields located in the southern portion of

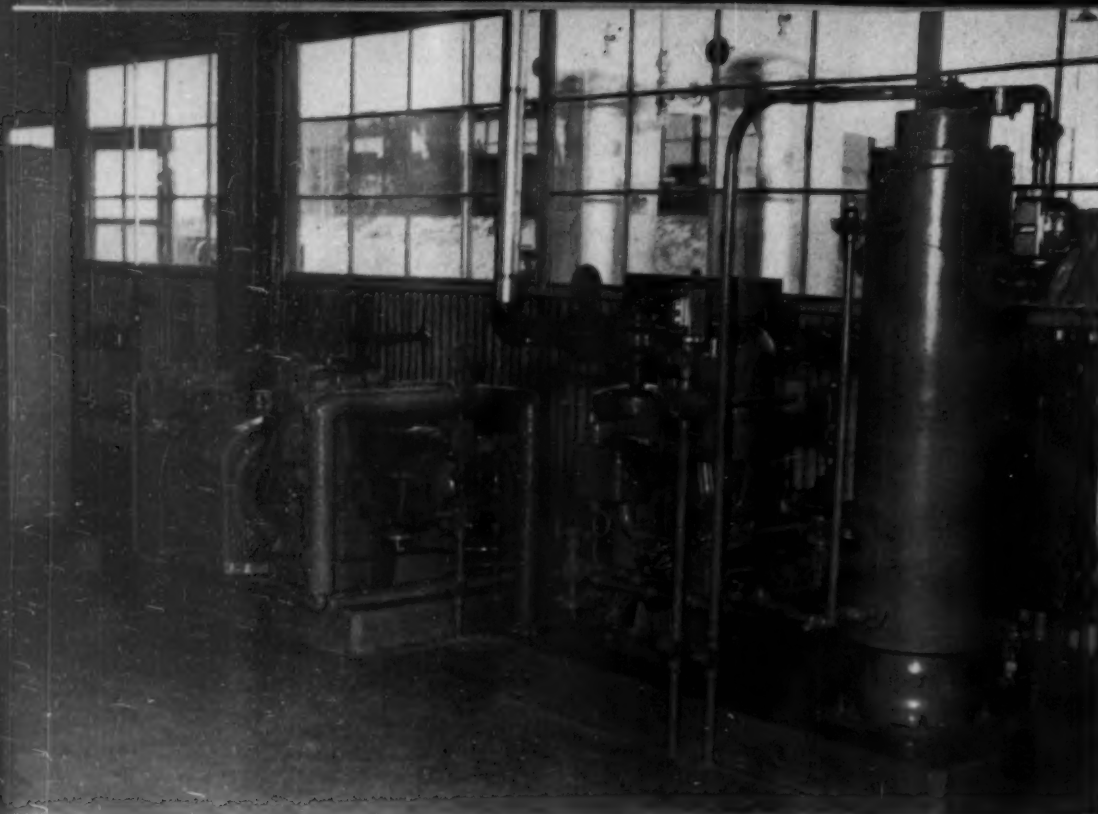
the San Joaquin valley; the northern line delivers from the Coalinga area, and is also used to send oil to Union's San Francisco-located Oleum refinery. Incoming crude from the south is heated and boosted through the lines by booster stations spaced at 12-mile intervals. Outgoing are two 8-inch lines, plus the dual-flow northern 8-inch. The two west-bound lines are laid to Union's coastal terminal at Avila, Calif., where there's a marine terminal for tanker loading.

At Junction Station, incoming crude is stored in seven 55,000 bbl. cone-roof storage tanks, the tanks

individually manifolded to the three incoming lines and to the three pump suction lines. Before crude is sent on its way, it's heated in one of two direct-fired heaters (replacing exhaust steam heaters of the old facility) which also burn crude. The Enterprise DSM-6s, rated 216 hp. at 720 rpm. with 80 bmep., are 8-in. x 10-in., solid-injection, normally aspirated, six cylinder, four-stroke-cycle diesel engines. The engines' ratings can be boosted to 324 hp. through supercharging, and upped from 80 to 120 bmep. Pump pressure rating and the gear service factor were designed for a possible increase to 1200 psig. in line discharge pressure.

View of engine room showing control panel and, outside, the dikes. Note Air Mase air filter, Fawick Clutch, Purolator filters and Viking safety controls on engine, and Alnor pyrometer on console.





The two Quincy air compressors adjoining the Sharples fuel oil centrifuge.

Each crude-burning engine drives a Wilson-Snyder 5-in. x 8-in. model 558P horizontal, single-acting, quintuplex plunger pump rated 540 bhp. at a discharge pressure of 800 psig. The engine drives the pump through speed reduction gears, "going on the pump" via a Fawick Model 24-CB-500 Air-Flex Clutch. This air-clutch minimizes torsionals encountered in the power train. Reduction gearing is Western Gear Co.'s Model S-69 with a 5.8 to 1 gear ratio and a class 1 AGMA service factor of 2.30. In action, the diesel engine is air-clutch coupled to the reduction gearing which in turn is directly coupled to the quintuplex pump. Approximately 50 psi. air from two air compressors operate the air-clutches of the six diesels. Another 150 psi. air actuates a Gardner-Denver air starter on each engine. The air starter engages the diesel's flywheel, gets it going on diesel fuel for the first fifteen minutes of operation. After that, and until fifteen minutes before closing down, the engines burn crude oil. Engines are returned to diesel oil operation during the final fifteen minutes before shutdown to purge the fuel system of heavy crude which, should it cool in the system, would require the dismantling and cleansing of fuel lines and injector pumps.

When studies and a previous crude-fueled diesel installation at Antelope station indicated that crude from the line could be successfully burned, Union's engineers had at hand three general types of crude: Heavy San Joaquin Valley crude, gravity 16-degrees API; viscosity, 70 SSF @ 122 degrees F. San Joaquin Valley refining crude—gravity 20-24 degrees API; viscosity, 220 SSU @ 100-degrees F. San Joaquin Valley waxy crude—gravity 32-36 degrees API; viscosity, 40 SSU @ 100-degrees F.

When Union decided that it had either to replace its Junction Steam station with new steam equipment or to convert to electric or diesel-powered pumps, it analyzed the cost-comparisons, came up with data supporting use of 16 gravity crude oil

from the lines as a possible diesel fuel. Previously Union had installed a diesel engined layout at its Antelope Station (first station downstream from Junction) with crude-burning diesels. Two years' satisfactory operation of these engines supported test stand data, showed that diesel engines could handle crude which analyzed:

Gravity, °API	15.7
Pour point °F	30
Flashpoint °F (closed cup)	178
Viscosity:	
SSF @ 70°F	1180
SSU @ 100°F	2468
SSU @ 130°F	763
Carbon residue, wgt. %	5.93
Ash content, wgt. %	0.04
Sulphur, wgt. %	1.15
BS&W as rec'd, vol. %	1.00

From experience at the Antelope Station it was evident that crude doubling as fuel oil would have to be carefully filtered and heated before flowing to the individual cylinder injector pumps. The crude fuel-oil treating system, just now being installed at Junction Station (although already in operation at Antelope) is an interesting piece of engineering. First off, there are three tanks adjacent to the pump house, but separated by a dirt-dike. There's a 202 bbl. tank for diesel fuel—used only during the initial warm up and close-down periods. There's a 1039 bbl. crude oil tank holding oil burned in the direct-fired heaters. And lastly, there's a 1000-bbl. crude-fuel storage tank. This tank contains the 16-degree API crude—direct from the main lines. Crude is pumped to an elevated 200-bbl. day tank. In the original setup, the day-tank gravity-flowed through over-sized lines to each engine where crude was heated by an exchanger in the jacket water systems to 180-degrees F. Heated crude then passed through a metal-edge filter in going to the suction of the engine's fuel-oil pumps. The crude discharged through an absorbent cloth

type filter before flowing to individual cylinder injector pumps.

Currently being installed is a more comprehensive filter system designed to rid the crude of all foreign matter down to 5 microns. Here's how the filtration system for crude fuel-oil works: in series with the day tank are four Winslow water-jacketed, cloth-packed filters. Heaters in the filters are supplied



by the engines' water jacket systems, so manifolded that all six engines (if operating) contribute. Unfiltered, untreated crude from the day tank is pumped around the 4-filter circuit by a 1 hp. electric motor. The pump is rated about 20 gpm., although even when all are operating, the six engines burn only about 2 gpm. Thus, ten times as much crude is constantly filtered as is actually used. In short order the once unfiltered day tank crude has been cleansed of all but 1/10 of 1 per cent of its foreign matter—this from an original approximate 3% contamination. What make-up crude is necessary flows constantly in small quantity to the day tank from the 1000-bbl. crude fuel-settles in the filters' bottoms and each is blown-

oil storage tank. The four filters not only help heat the engines' fuel crude, but remove impurities—the filters being graduated so that larger particles are removed first, then the smaller. And finally, there are two super-fine Winslow filters at each engine—these removing particles down to 5 microns. Filters not only remove particles, but also separate water and solids. Water that is separated settles in the filters' bottoms and each is blown-

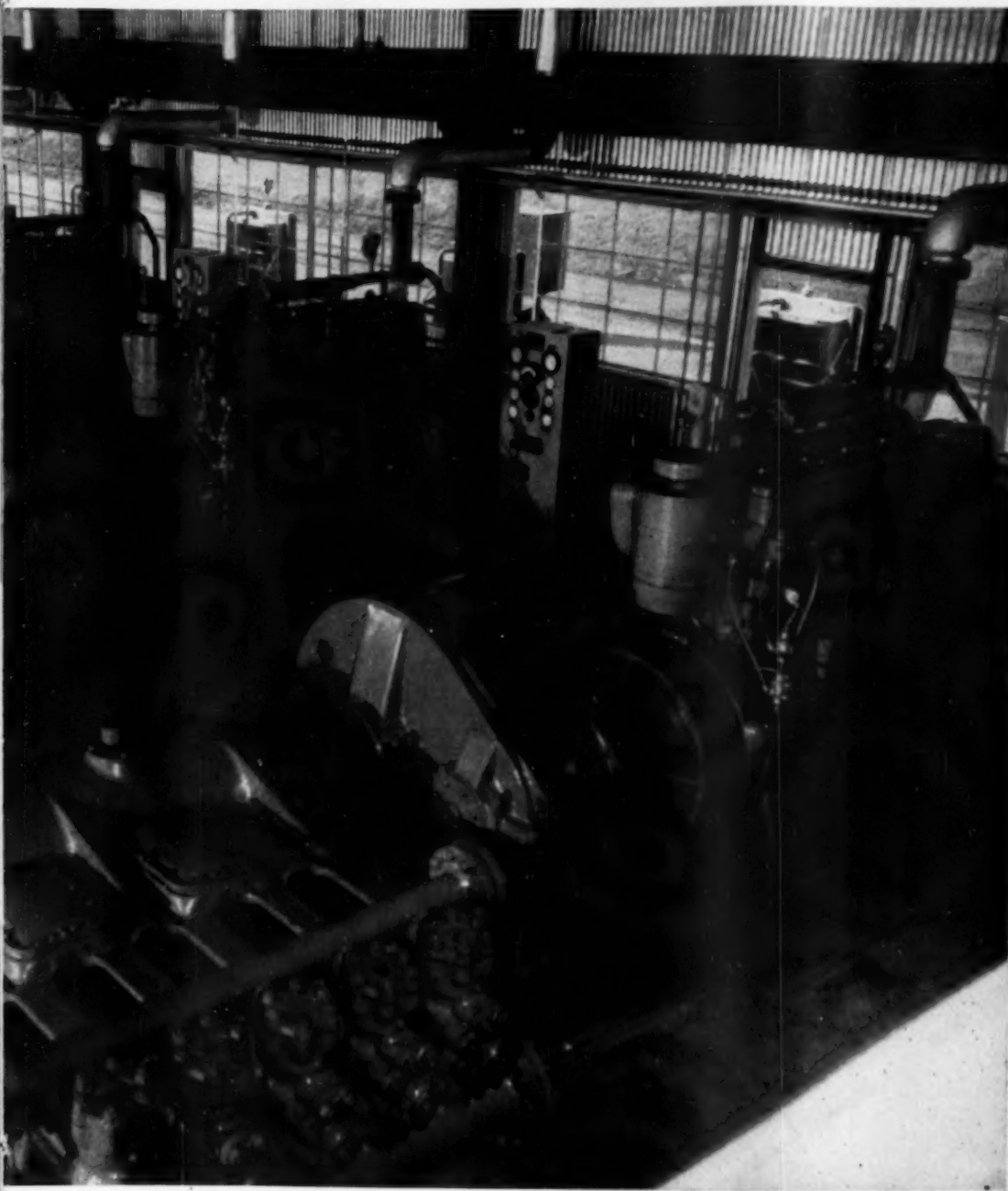
(Union's Guardol) is required. This is Union's supplement 2 lube oil and it also helps combat the fuel's high percentage of heavy residuals. The engine's circulatory pumps force lube oil through Honan-Crane filters and Thermxchanger Inc. oil coolers. The lube oil heat exchangers and crude fuel-oil heaters are in series with the jacket water systems. Treated water make-up is provided by a gravity tank common to all engines.

Each engine is provided with an Air Maze crankcase vacuum vent. The function of which is to provide a crankcase vent for expanding air and gases which move up into the filter which filters out the oil for return to the crankcase.

Jacket water is cooled by individual Young Radiator Co. Model 144 fan coolers, driven by electric motors. Radiators are located outside the pump house with their piping to the engines' water jacket systems run through easily accessible steel-plate-covered trenches. A 3-way self-contained valve maintains engine outlet water at 185°F.

The station's six diesels driving six pumps are so located that two pumps are placed on each line. This engineering allows for variances in line capacities and requirements, since the load may vary from a maximum 540 bhp. to 300 bhp. At present, the air-clutches are manually engaged when the engines reach some point above 400 rpm. This point is determined by current line pressures and pumping requirements. For operation of any one (of the three) lines at reduced capacity, it was desirable to install two smaller pumping units on each line rather than a single large one. This also provides spare pumps when all lines are not operated full capacity. Thus, with pumps #1 and #2 operating main line #3, for example, one pump is used on reduced throughput and both pumps at maximum capacity. The 8-inch #1 heavy oil line has a throughput of about 1,080 bhp. when operated at a discharge pressure of 800 psig.

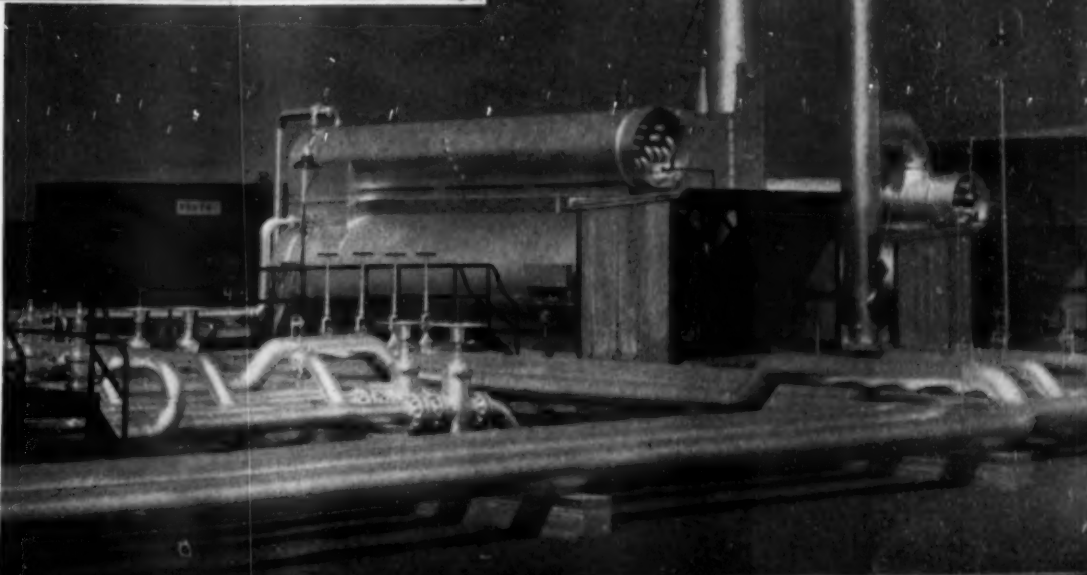
View of the heavy fuel heaters.

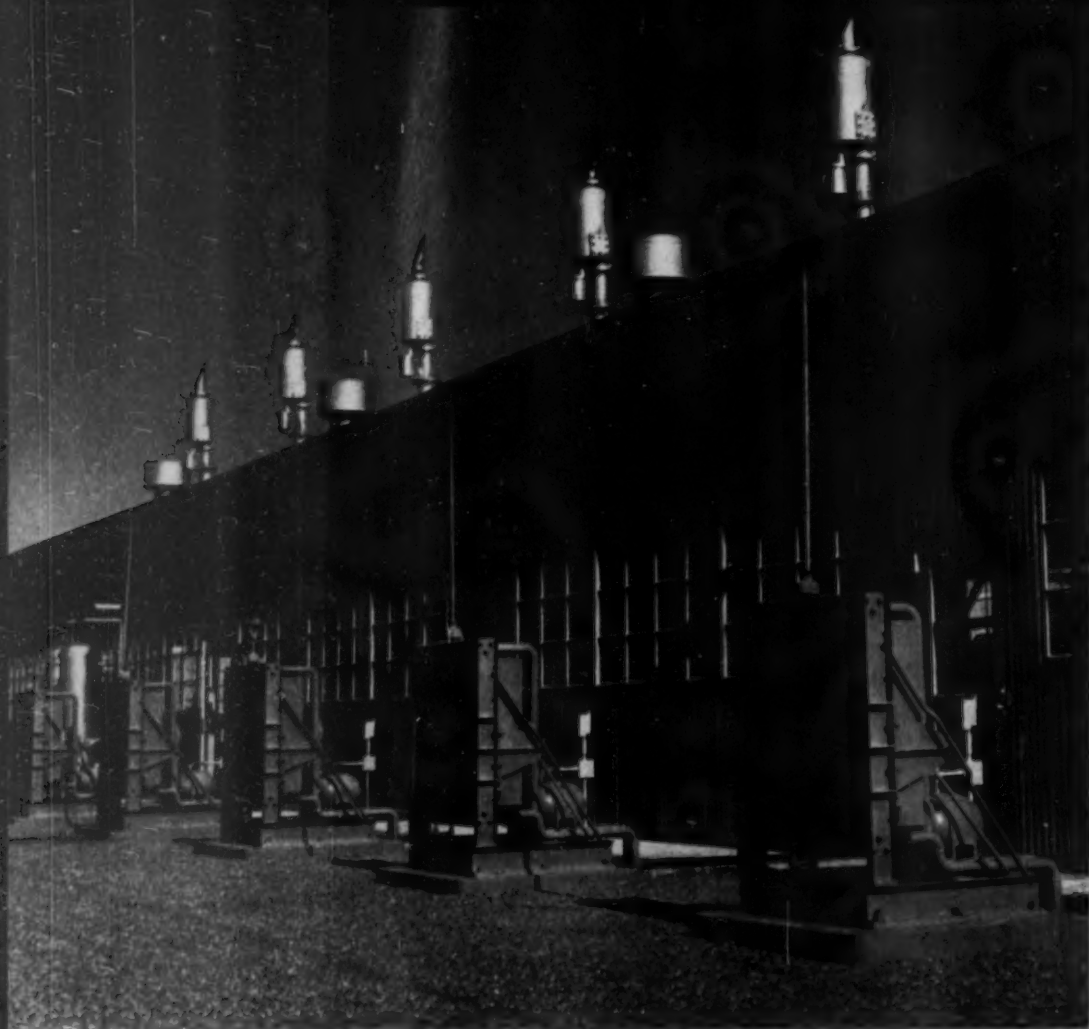


Interior view of the Junction Station showing the six Enterprise diesels, their Fawick air clutches, Western reduction gears, direct coupling and Wilson-Snyder quintuplex pumps.

down once during an 8-hour shift. No regular maintenance schedule for removal and replacement of cloth filters has been set-up as yet. Filter temperature is maintained at about 160-degrees F. by the water jacket system.

Lube oil at each engine is continuously filtered and cooled through the lube oil heat exchanger, maintaining it at about 175-degrees F. Because of the fuel oil's high sulphur content (approx. 1.15% by wgt. percent), a high detergency lube oil





The Young radiators and Maxim silencers outside the engine room.

Dikes surround the 1000 bbl. crude fuel oil tank, left. Center, 200 bbl. diesel fuel tank. Right, tank for crude oil to be burned in the direct-fired heaters.



All six engines, the tank farm, three booster and two heater circulating pumps are monitored from a double-glass enclosed, sound-proof control booth. Main features of the control center is its console panel board whose alarms, gauges and self-recording graphs monitor: (1) excess pressure on any of the three lines discharging from the station; (2) excess pressure in incoming lines; (3) low water-level in the diesel jacket water make-up tank; (4) operation of the station's sump pump; (5) suction and discharge pressure of all booster and main line pumps; (6) discharge pressure, recording of the three outgoing lines; (7) incoming and outgoing temperature recording of the heavy oil line. In addition, a lower central section of the console contains automatic remote tank gauges indicating the level in the station's seven 55,000-bbl. storage tanks. The control room is air-conditioned.

Fire-protection is an important built-in security considering the station's remote location. There's a 5,000-bbl. storage tank (filled through a 6-inch water line from Lost Hills, 8 miles away) and a pump house with two centrifugal fire pumps, one electric, one gasoline-driven. A dry-type automatic fog system protects the main pump house and is rigged with a Sentry automatic-opening flood valve. Moreover, the entire fire water system is maintained under pressure by cross-connection with the station's domestic water supply pump. Installed in this system is an Auto-Call Flow Switch. If there's line pressure loss due to the opening of a sentry valve or a fire hydrant, the switch energizes the electric motor-driven fire pump, locking in this circuit. A second Auto-Call switch in the main pump house fog system closes the contacts on the station's fire horn, simultaneously putting a coded signal on the telephone system.

Thus, Union's Junction Station is a self-contained, isolated, but highly-efficient operation, whose six diesels burn crude from the lines they monitor. Crude-fueling has meant sizable savings in addition to eliminating a long and tedious truck haul.

List of Equipment

Engines—Enterprise.
Gears—Western Gear.
Pumps—Wilson-Snyder.
Fan Coolers—Young.
Air Clutches—Fawick Air-flex.
Air Starters—Gardner-Denver.
Safety Controls—Viking.
Oil-bath Air Filters—Air-Maze.
Air Compressors—Quincy.
Lube Oil Cooler—Thermxchanger Inc.
Lube Oil Filter—Honan-Crane.
Fuel Oil Filters—Winslow Free-flo.
Centrifuge—Sharples.
Silencers—Maxim.
Tachometer—Weston.
Pyrometer—Alnor.
Pressure Gauges—J. P. Marsh.
Filters mounted on engine:
Fuel Oil, Duplex Primary-Strainer-Coarse; Fuel Oil, Duplex Secondary-Filter-Fine; Lube Oil, Simplex for governor only—Purolator.
Governor—Woodward.



Harvey Christensen, left (on platform) the special Caterpillar representative, explains the Caterpillar mobile unit to William Torrey, center, of station KGNC of Amarillo, Texas.

INSTALLATION PROBLEMS AND OPERATING RESULTS OF DIESEL ELECTRIC EMERGENCY SETS

This Demonstrates the Activity of One Engine Company in Developing Nation-Wide the Use of Diesel Generating Sets for Local and National Emergencies

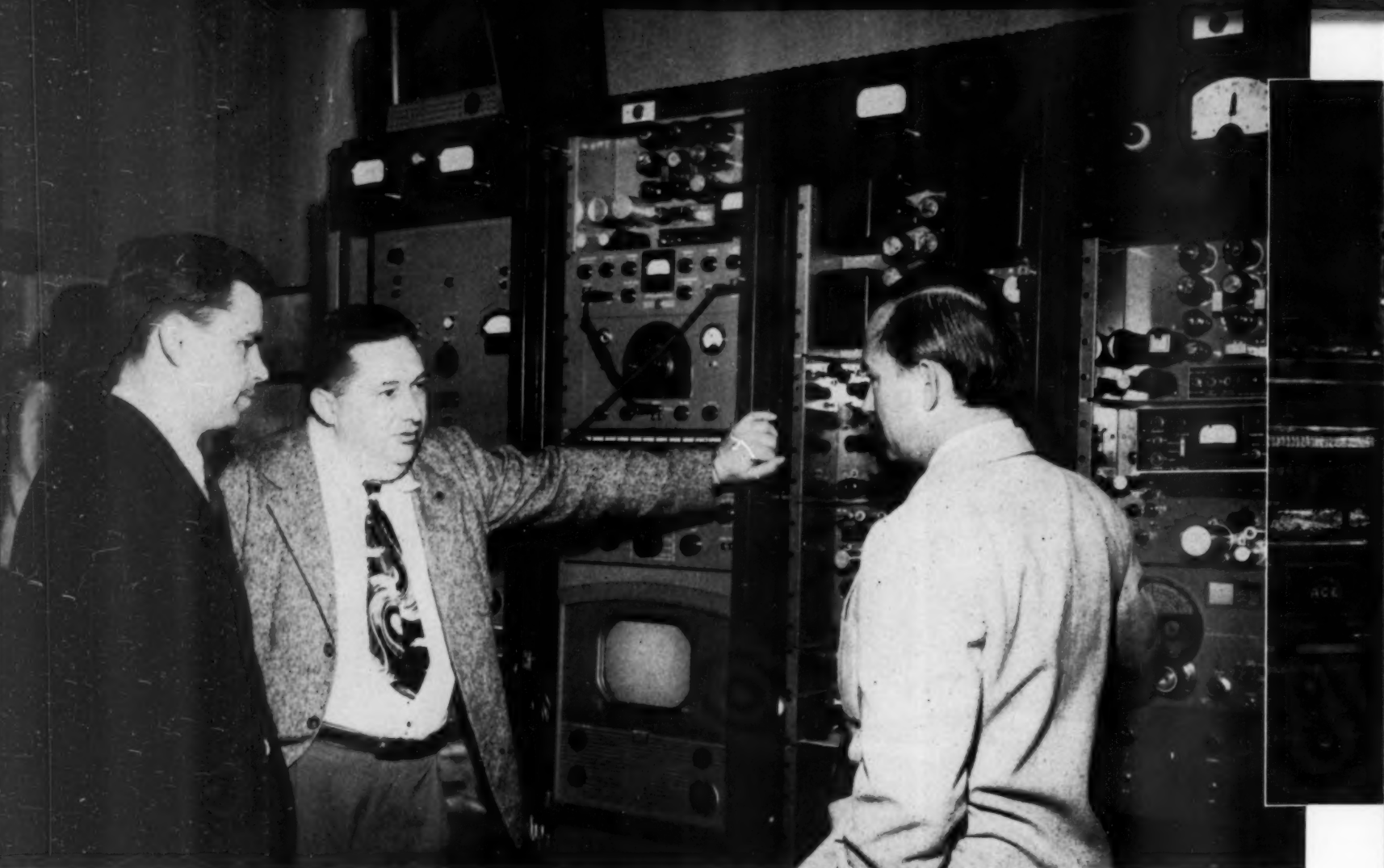
THE growth of communications such as telephone, radio, television, telegraph, and now "Conelrad," with their requirements for uninterrupted service, have brought added responsibilities and problems. The prime problem is a reliable emergency power source. Failures of the main power supply can be disastrous, unless protected by an emergency source of power to insure uninterrupted service. In considering a secondary or emergency source of electrical energy, dependability, of course, is the chief consideration. Past experience with fire hazards and explosions with attendant high insurance rates on gasoline engine powered

standby units have made the diesel engine a prime requisite for standby units, especially where remote automatic operation is desired. Operating records for installations going back as much as twelve years have proved the reliability of the diesel electric sets for standby power. In addition to dependable performance, factors of considerable importance are ease of starting, voltage and frequency control, and

the ability to rapidly take over the load. Of lesser importance are the factors of minimum noise and vibration, ease of installation, simplicity of control and safety.

While air, gasoline engine and electric starting systems are available for the diesel engine, the electric starting system lends itself most readily to remote

CIVIL DEFENSE INSTALLATIONS



K. C. Whitman, right, engineer of KLAC-TV in Los Angeles, explains the patch bay and frequency measuring equipment at the station's transmitter on Mt. Wilson to C. E. Spicer, left, Dumont Laboratories and Willis C. Shanks, KKTU, Colorado Springs, Colo.

and automatic start systems. With a standard size battery, electric starting is usually limited to a place where the engine room temperature will be maintained at 60 degrees F. The ideal starting system is one which is completely automatic where the transfer of power source from normal to emergency supply takes place without the attention of any operating personnel. In some cases, however, it may be felt desirable to have the standby unit under manual control of the operator at all times. If this is desired, a push button remote start feature may be located at one or more positions including the operating console. Some station engineers prefer the stop start and frequency control button located on the operating console.

Should it be desirable to have a portable installation, units can be obtained mounted on skids or trailers. With such a mounting, vibration dampers are built in as part of the installation and it is possible to set such a unit on any type of surface without having it "walk" due to vibration. In the permanent type installation it is advisable to supply an adequate foundation. In such an installation if vibration dampers are not used between the base of the machine and the foundation itself and, it is desired to minimize the small amount of inherent vibration, the foundation itself can be isolated from the building footings, floors, etc. by installing an insulating material such as cork board or rubber, between the foundation and the floor slab. No ob-

jectionable vibration has been encountered in post installation where ordinary precautions have been observed.

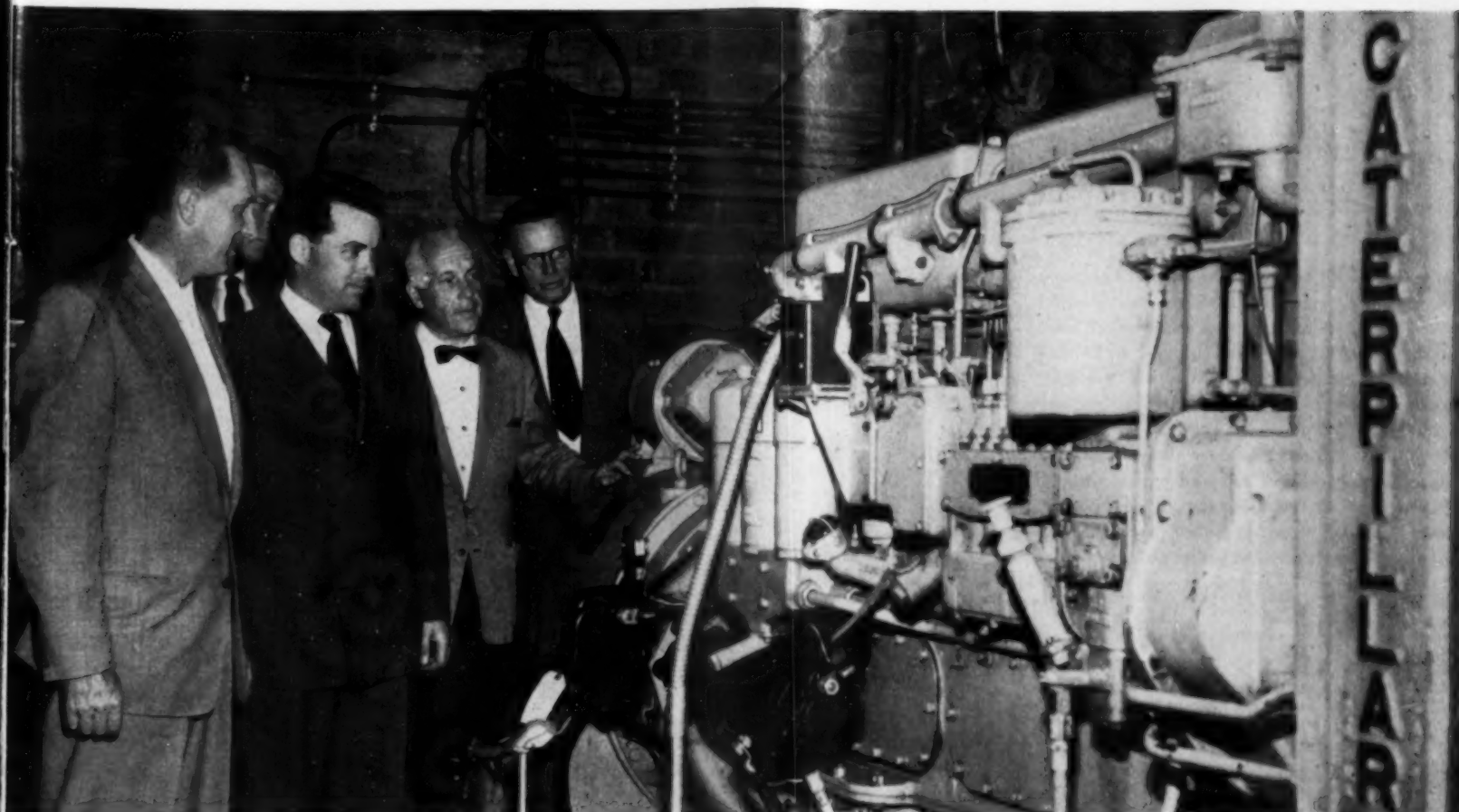
Radiator cooling should be used where possible. If any type of heat exchanger is used there must be an adequate supply of cooling water to the exchanger and all pipes should be sloping upward so that they will free themselves of air. Adequate exhaust provisions should be available with as short a run of exhaust pipe as practical. A fuel tank should be supplied which is large enough to hold a week's supply of fuel. To prevent long runs of cable the location should be relatively near the present electric service point or some convenient main feeder.

For those installations requiring extremely close control of frequency an isochronous governor is available as an attachment. This governor (Woodward UG-8 or equivalent) is a precision built governor of the hydraulic type. The governor acts through oil to increase the amount of fuel to be injected into the engine when the load increases and a spring acts to decrease the fuel with decreased loads. This governor is adjustable from 0 to 5% regulation as the application may require. An electric motor (used for speed and frequency control from a remote push button station) can be supplied mounted directly on the governor. Voltage regulation is accomplished by one of two methods.

On an externally regulated generator an external, automatic voltage regulator is used. On a self regulated generator it is a function of the alternator itself to automatically control the voltage within certain limits.

Stability may be defined as a generator's ability to maintain voltage when normal loads are suddenly thrown on or off the line and to continue producing usable energy even when the generator is subjected to wide fluctuations in the load demand. A generator with a low degree of stability may lose voltage when the load is fluctuating widely or when a normal load is suddenly applied.

A self regulated generator driven by a diesel engine equipped with a mechanical flyball governor will provide 13% voltage regulation, or better, on an 8 power factor load from no load to continuous full load. WSYR-TV Syracuse, N. Y., is using this diesel engine, a self regulated generator combination, as standby power, for its TV transmitter. A self regulated generator driven by a diesel engine equipped with a Woodward hydraulic governor will provide 11% voltage regulation, or better, on an .8 power factor load from no load to continuous full load. WOI-TV, Ames, Iowa, is using this combination to supply its entire power requirements as no outside power is available. An externally regulated generator driven by a diesel engine equipped with a Woodward hydraulic governor will provide



Looking over the Caterpillar D13000 generating set used by KLAC-TV as emergency power at its Mt. Wilson, California station. Left to right: Col. A. E. Altberg, Maxwell Air Force Base, Montgomery, Ala.; Allan M. Duland, engineer, Ford Foundation; Roland W. Richards, Miami National Production; and George Fenn, manager of sales development at Caterpillar.

$\frac{1}{2}$ of 1% voltage regulation at .8 power factor from no load to continuous full load. WBEN-TV, Buffalo, N. Y., uses this combination for standby power.

An important feature is the safety factor. When diesels are used no highly inflammable fuels are involved. Besides decreasing the chance of accident due to fire it involves in many cases as a result of this, a reduction in insurance premiums. One further benefit along this line is the fact that because the unit requires little or no attention besides routine checks it may be installed at a remote location from the main building.

A partial list of installations of diesel electric units in radio and TV stations include the following: WOI, WRUF, WREC, WDAY, KHJ, KLAC, WMIT, WSYR, WAVE, WVEN, KLZ and CHNG. Several of these stations rely on their units for all of the power used and the units have compiled enviable records for dependability. One such typical installation is that of WMIT. This station operates on AM and FM with the transmitter location on Mt. Mitchell, North Carolina, at an elevation of 6578 feet above sea level. The antenna stands 6749 feet above sea level, and is reported to be the highest earthbound installation east of the Mississippi River. At last report the station had an ERP. of 73,000 watts. Four separate diesel electric units totaling 276 kw. are used at this location to power the transmitter, lighting, heating and cooling systems, water pumping, antenna de-icers and miscellaneous equipment.

Another installation in use on a TV and FM application is the one at WOI. This installation consists of two units totaling 110 kw. These units supply all of the electricity needed for the station including power and lighting. The station at present consists of a 3 kw. FM transmitter and a TV transmitter rated at 5 kw. video 2.5 kw. audio. WOI has plans for increasing its power and intends to install another diesel electric unit rated at 150 kw. to provide for the additional load. Mr. C. Hoover, superintendent of the transmitting station, gave this opinion of the dependability of diesel electric power when he said of the installation, "It is outstanding reliable power. We are not dependent on high lines."

An example of a strictly standby installation is the one at WBEN-TV. This unit rated at 150 kw. sup-

plies power for 20 kw. RCA transmitter, as well as the building requirements. To date this unit has been used in emergencies several times. Special features of this installation include remote, electric starting, residential muffler silencing and automatic louvers on the cooling radiator which open by electric motor drive when the engine starts.

A nearby neighbor WSYR-TV has a unit rated at 83 kw. to power a 5 kw. transmitter tower lights and de-icers and the necessary building lighting and power. The installation includes a skid mounted unit with an air cooled radiator with automatic louvers, residential type muffler, 3% mechanical governor and electric starting with an automatic start stop cranking panel. In addition, a Chromolox engine jacket water heater is used to maintain proper operating temperature at all times.

Closeup of the emergency power display at the Caterpillar Tractor Co. exhibit at the recent annual management conference of the National Association of Radio and Television Broadcasters.



PRECISION ENGINE BALANCING

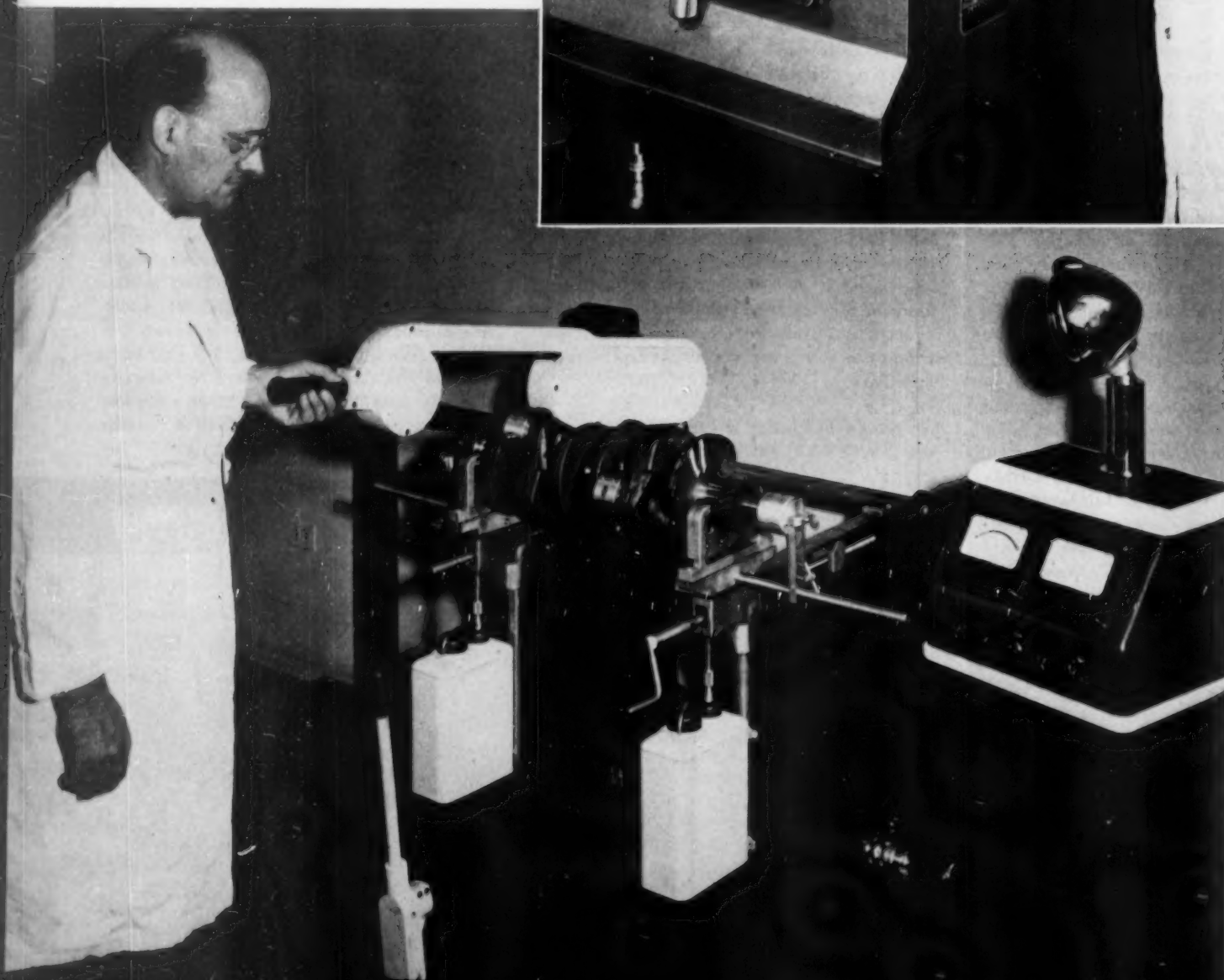
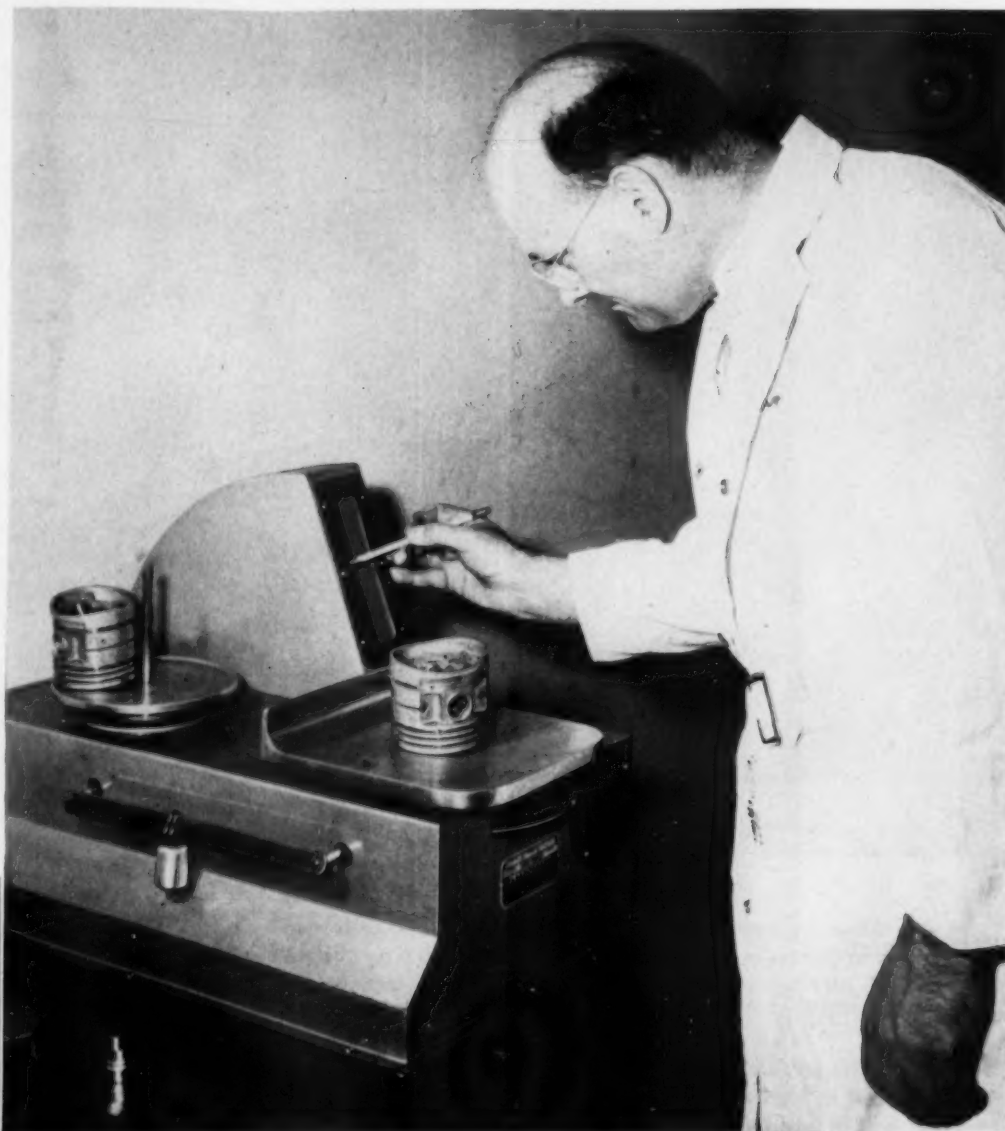
By RALPH P. BUSCARELLO*

PRECISION engine balancing was first popularized by auto race car drivers, and then followed by the hot rod boys who wanted more horsepower as well as faster acceleration out of their engines. These fellows were not too concerned about the increased life of the engine, but were surprised to find out that a precision balanced engine produces as much as three times the original life of a non-precision balanced engine with the average being around twice the life of a non-precision balanced engine. It is true that engines are balanced at the factory, but because of mass produc-

*Mgr. Balancing Dept., Merrill Engineering Labs., Denver 3, Colorado.

Checking the balance of the pistons. All of the pistons are brought to within $\frac{1}{2}$ gram of the lightest piston.

Balancing the V-8 crankshaft. Note the brass "bob" weights which take the place of the rod and piston assemblies necessary in the dynamic balance of the V-crankshaft.



tion methods, the tolerance or amount of leeway is greater than that of a precision balanced engine.

Phenomenal results have come out of this fairly new field. No extensive tests have been made, but there are many reports from those who have precision balanced their engines. The typical increase in horsepower is from 10 to 15%. When you consider that this is useful horsepower, you also realize that it would take much more increase in in-put horsepower to obtain this 10 to 15% output. Although increase in horsepower is an advantage, the greatest advantage of a precision balanced engine is its increased life of from 2 to 3 times that of the non-precision balanced engine. After the facts of balancing are seen, it will probably be easier to see why this increase in life comes about.

The first step is to weigh each piston and record its weight in grams on a small card. The weight difference from the heaviest to the lightest piston is usually from 6 to 20 grams for automotive pistons and from 10 to 30 grams for truck and diesel pistons. In many cases the difference is even greater. The lightest piston is found and all of the other pistons are brought down to its weight, with a tolerance of plus $\frac{1}{2}$ gram minus zero, which is the tolerance used at Merrill Engineering Laboratories, 1240 Lincoln, Denver, Colorado. Merrill's not only operate a precision engine balancing service, but manufacture balancing machines and devices as well. Each piston is brought down to the weight of the lightest piston by removing metal from the inside of the skirt by turning on a lathe.

This does not affect the outside dimensions, but just removes weight from the rough inside of the casting. After all of the pistons are balanced to each other, the next step is to balance the connecting rods. Reason sometimes tells a person that the pistons should all be the same weight as well as the rods, but very often the person who balances his own rods does not realize that the rods have to be balanced end for end. That is, all of the rotating ends should be brought within a half a gram of each other, and then the same for all of the reciprocating ends. Each end must be done individually as the reciprocating end has only half the effect on the crankshaft as the rotating end. The typical new rods usually result in a difference in weight from the lightest to the heaviest rod at the rotating end from 6 to 15 grams, with some going over 25 grams.

For reciprocating ends the range is usually 4 to 12 grams. Metal is removed at the rotating end by grinding some of the metal that surrounds the bolt hole until all of the rotating ends of the rods are brought within $\frac{1}{2}$ gram from the lightest rotating end. This is done in such a way that it will not weaken the rod. Metal is removed from the reciprocating ends either with a rotating cutter or by grinding until the same tolerance is achieved as with the rotating end. The grind marks must always follow the contour of the rod rather than go across it, as the grind marks may result in a stress concentration that can eventually start a crack under repeated stress.

It would be best to explain the precision balancing of a crankshaft by defining both static and dynamic

unbalance first. For example take a uniform shaft that is turned on a lathe and machined all around, so that the shaft should be in perfect balance, assuming no heavy spots in the metal. Picture a mass of weight attached to the bottom side of the shaft, exactly between both ends. If this shaft were mounted on rollers, this heavy mass would cause the shaft to roll in such a way that the mass would roll to the bottom. The mass which causes this to roll to the bottom is the statically unbalanced force as this occurs even when the shaft is not motion.

Most garage men realize that static unbalance can be located in this way on a crankshaft, but do not realize the effect of dynamic unbalance. In order to picture this, assume that the same mass is divided into two equal weights—one placed at the extreme left end of the shaft, and the other placed 180 degrees opposite this position and at the right end of the shaft. It is easily seen that these two weights counterbalance each other statically by looking at the end view. No point would roll to the bottom, but if the shaft were revolved, centrifugal force at each mass, pulling away from each other in two different planes, would cause the shaft to try to turn over end for end as it is rotated. The shaft is held in place by the bearings, but the forces that tend to flip it end for end, go into friction and shock loads on these bearings causing excessive wear and pitting. To correct this condition, the unbalanced force must be removed by drilling or grinding, at the position of this unbalanced mass. Another method is to counterbalance by adding weight, such as by welding or bolting on a piece of metal.

When a diesel crankshaft is to be balanced, the balancing machine indicates the position of unbalance with the aid of a stroboscopic attachment on the machine. The amount of unbalance is indicated by the meter reading. The operator notes the position and amount and removes weight from the crankshaft by drilling or grinding. Drilling is the usual method when the unbalance weight is shown to be in the crankshaft counterweight. But if the unbalance weight is in the throw end of the shaft, metal is removed by grinding over a large area on both sides of the throw. After making these corrections, the shaft is then brought back to the machine and the process repeated until the unbalance reading is within the precision tolerance of less than 1 in. gram. The typical new shaft will produce a meter reading on the Model 704 Stewart-Warner Electronic Industrial Balancer, manufactured at Merrill's of from 4 to 7. When this shaft is brought within tolerance, the meter reading should read no higher than 0.4. The flywheel, being a rotating part, must also be balanced, but is balanced separately on a special mandrel. The flywheel may be balanced together with the shaft but changing the flywheel would then result in upsetting the balance of the shaft. When each rotating part is done individually, instead of together, changing any of those parts would not upset the balance of any other part. Corrections are made on the flywheel by drilling on the outer edges of either face, depending on where the unbalance is indicated by the stroboscope on the balancing machine.

After the flywheel is balanced, the pressure plate is

mounted on the flywheel for balancing, but not until three aluminum spacers are used to take the place of the clutch disc thickness. In this way the pressure plate springs are compressed during the balancing just as they are during the operation of the engine. If the engine has a torsional damper, the torsional damper should be balanced in the same manner as the flywheel. One Denver trucking firm cured a plague of cracking crankshafts by giving a precision balance to the torsional damper.

By removing the vibration in the damper, repeated stresses which cracked the shaft were eliminated. Before attempting to balance a flywheel and clutch assembly or torsional damper, it is wise to check the mounting flange on the crankshaft for run-out.

If the radial run-out is more than two thousandths of an inch, it does not pay to balance the flywheel or damper as the relocation of the flywheel mass in a different center line than the mass of the crank would result in a tremendous unbalance. After the clutch pressure plate is balanced on the flywheel, some sort of marking should be placed on the clutch as well as on the flywheel, so that the clutch pressure plate would be located on the flywheel in exactly the same position that it was balanced in.

By turning the clutch to a different set of holes, other than the ones that were originally aligned during balancing, unbalance will result. Evidently the amount of tolerance in the location of the bolt holes is enough to relocate the clutch pressure plate in the wrong position.

Some may wonder how there can be any smooth engines at all with the wide tolerances that are used in production balancing. Evidently diesel engine builders count on a light piston being attached to a heavy rod or vice versa, so that the different unbalanced forces counter balance each other. This does not always happen, but instead often these unbalanced forces add up to make even greater unbalanced forces, such as a heavy reciprocating end of a rod attached to a heavy piston and both at the heavy end of the crankshaft. Although this case would result in a very pronounced vibration, the so-called milder cases are subtle in the wearing out of engines. The small vibration that is introduced may be isolated from the frame of the machine and not often felt by the driver or operator, but the bearings in which the shaft rotates receive every minute vibration and excessive wear results.

Precision balancing an engine before putting it together again, insures against having to tear that engine down again to find the cause of vibration. The cost of precision balancing an engine has paid for itself many times over again by decreased maintenance. One trucking firm has found that the tear-down time between overhauls has been tripled simply by giving a precision balance job to the parts used in the overhaul. The cost of precision balancing an engine is very cheap insurance that the engine will function properly for a long time. It is no wonder that the results obtained by automobile racing drivers, hot rodders, and truckers has been inaugurated into commercial vehicles such as tractors, road equipment, and trucks.



A rebuilt Cummins diesel engine is positioned on chassis frame with a Clark mobile crane. Floor cranes, mounted on large roller wheels, are also used in the overhaul bay to remove and install chassis units.

Modern equipment like this portable type of electronic wheel balancer permits P-I-E to maintain rapid and efficient maintenance schedules. On through runs, only 3 hours elapse from time unit enters shops until it is on the road again.

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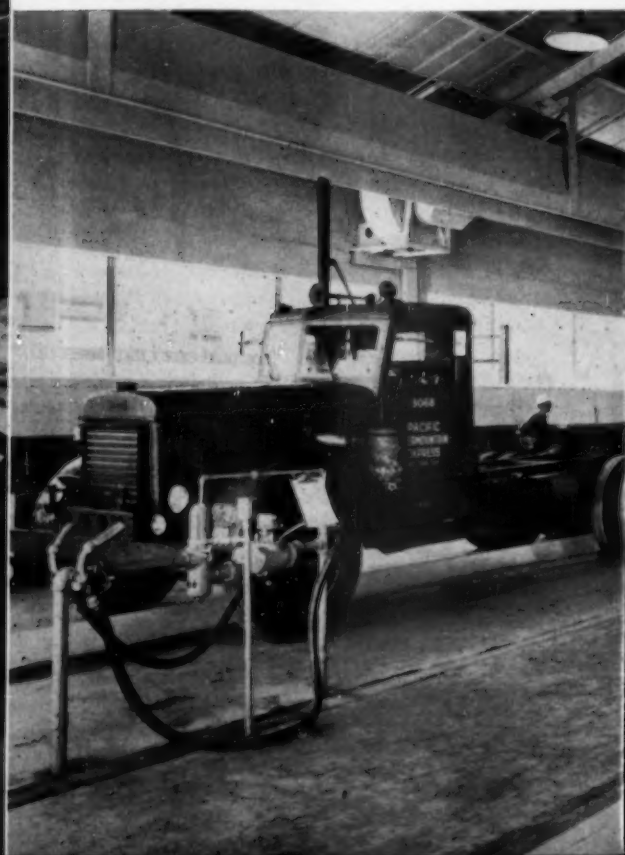


\$2,000,000 DIESEL MAINTENANCE MIRACLE

THE history of the Pacific Intermountain Express Company during the past twelve years is distinguished by one thing—continued progress through standardization and research. But to tell the complete story of how P-I-E grew from a motor transport company operating a total of 3,945,791 miles in 1941 to one that today operates in excess of 40,000,000 miles year, would fill a book. Certainly one of the more important, and interesting, chapters in such a book would deal with P-I-E's maintenance program, which keeps hundreds of line-haul diesel units carrying goods over these millions of miles virtually eliminating road failures. For this big investment in equipment is of little value without proper care and maintenance.

The heart of this maintenance system is P-I-E's \$2,000,000 central service and overhaul shops building, located on a ten-acre tract contiguous to the freight terminal in Denver, Colorado. The prime reason for locating the plant there is that the scheduled operations of P-I-E regularly brings all road tractors and trailers into Denver (with the exception of 42 units which operate exclusively between Kansas City, Chicago and St. Louis).

Completed in 1948, this building is considered to have the largest and best equipped truck and trailer maintenance shops in the country. Some 300 maintenance people, working in three 8-hour shifts, keep the diesels rolling. And it is here, in these



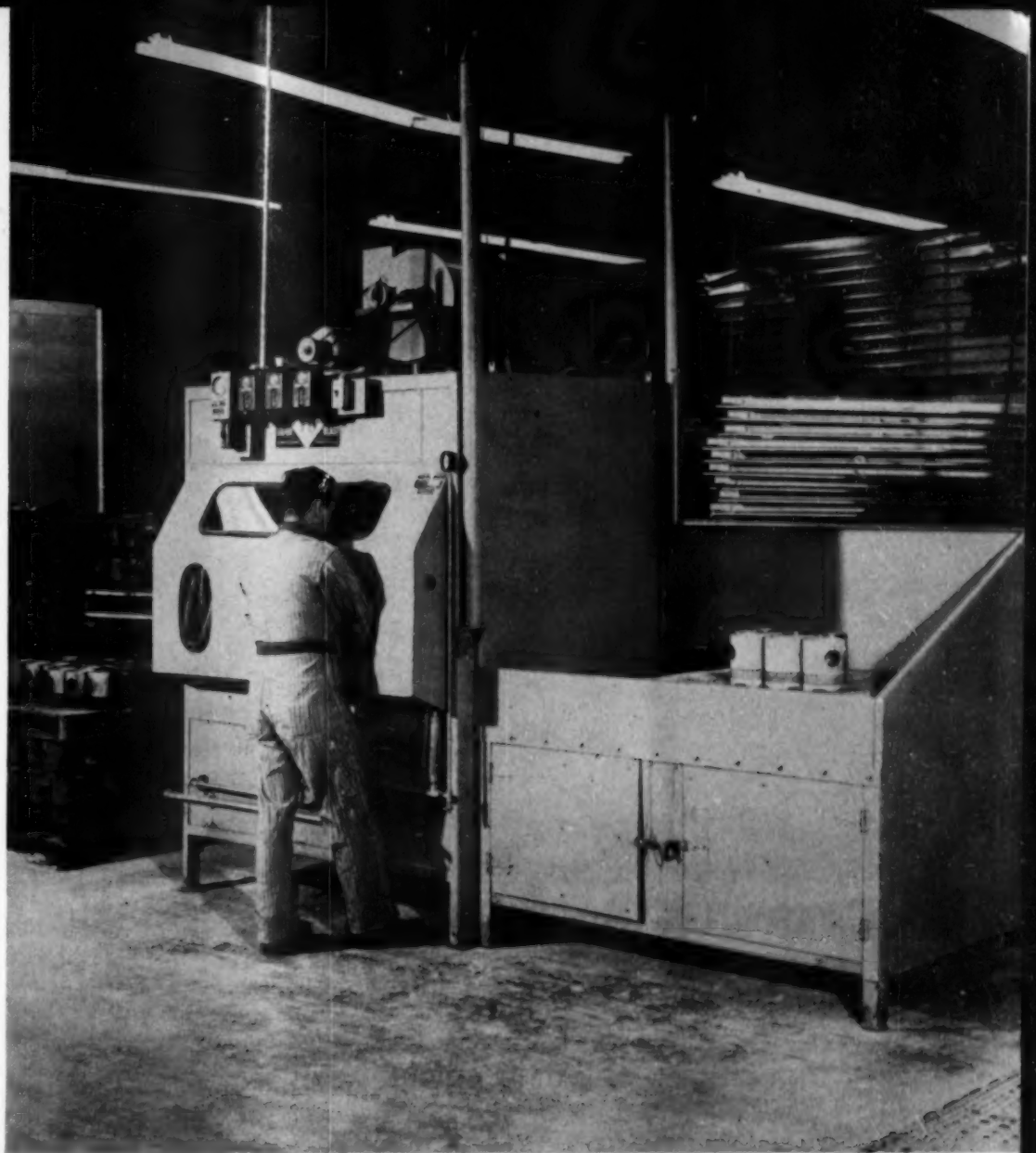
P-I-E's General Shops Building in Denver Considered Largest and Best Equipped in the Country

shops, that maintenance miracles are performed, as over 60 tractors and 60 semi-trailers are run through the inspection and servicing lines daily.

The Denver general shops building is divided into three parallel sections—each with approximately 1,600 square feet of floor area. One of the outer sections is set up for servicing and preventive maintenance of line-haul equipment; the center section includes offices, employee locker and toilet rooms and a stores and parts room where an inventory of supplies and parts valued at \$200,000 is maintained at all times; while the third section includes overhaul shops where equipment is completely disassembled and rebuilt after it has been operated a predetermined number of miles.

Upon entering the preventive maintenance section, tractors and trailers are steam-cleaned and washed. They then move down one of four service lanes where all mechanical, electrical and tire adjustments, lubrication, oil changes and under chassis inspections are made on a production line basis. An average of three hours is allowed for the inspection and servicing of line-haul equipment. Since all P-I-E tractors have vertical exhaust stacks, removing fumes from this shop is achieved by two

Preventive maintenance is done on production line basis for tractors and trailers in P-I-E's general shops in Denver. There are four well-equipped and lighted lanes in this section; two for power units and two for semi-trailers.

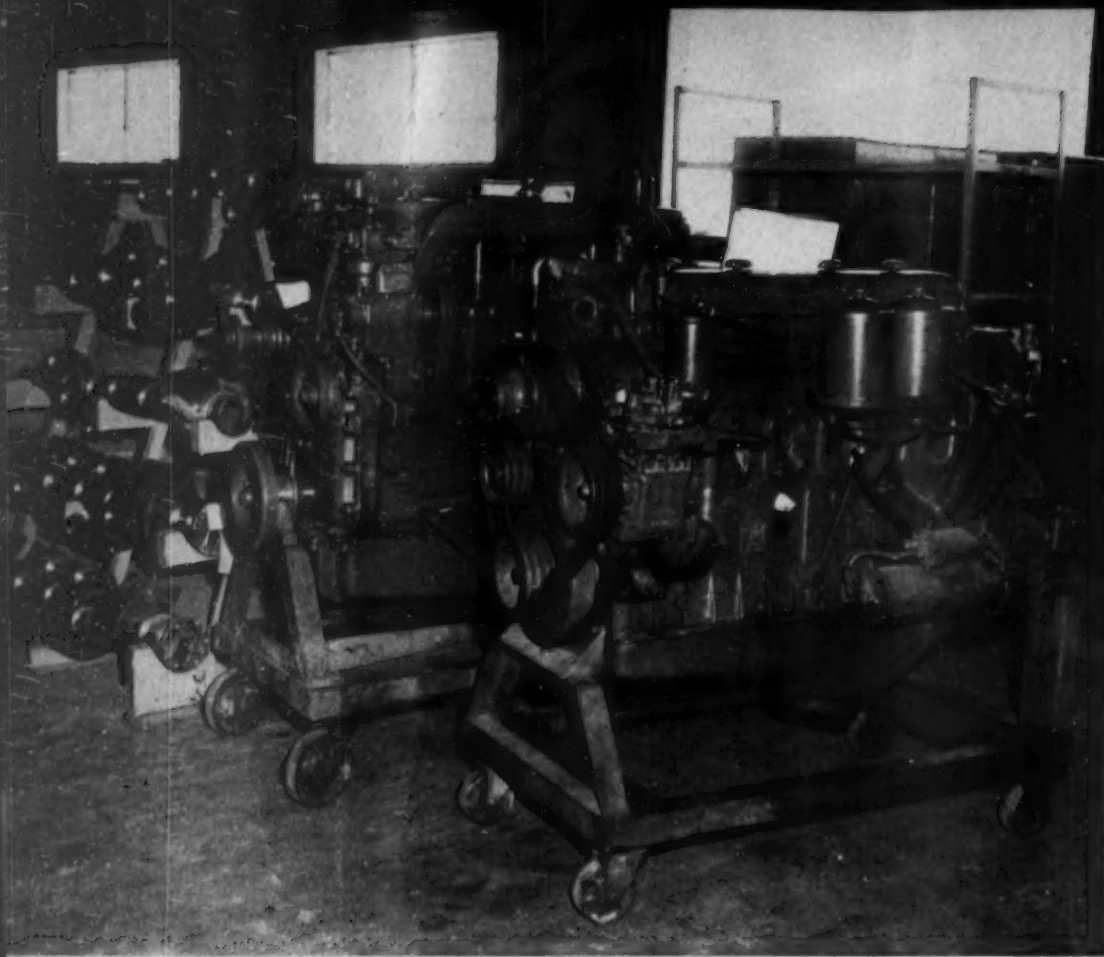


Operator is shown cleaning diesel part in Vapor-Blast Liquid Honing machine. Note special hand-openings and observation window which permit the work to be done inside the enclosed booth.

Operator checks front axle beam for metal defects and cracks on Magnaflux machine. Note black-light gun in worker's hand which makes it possible to catch defects that cannot be seen by the human eye.

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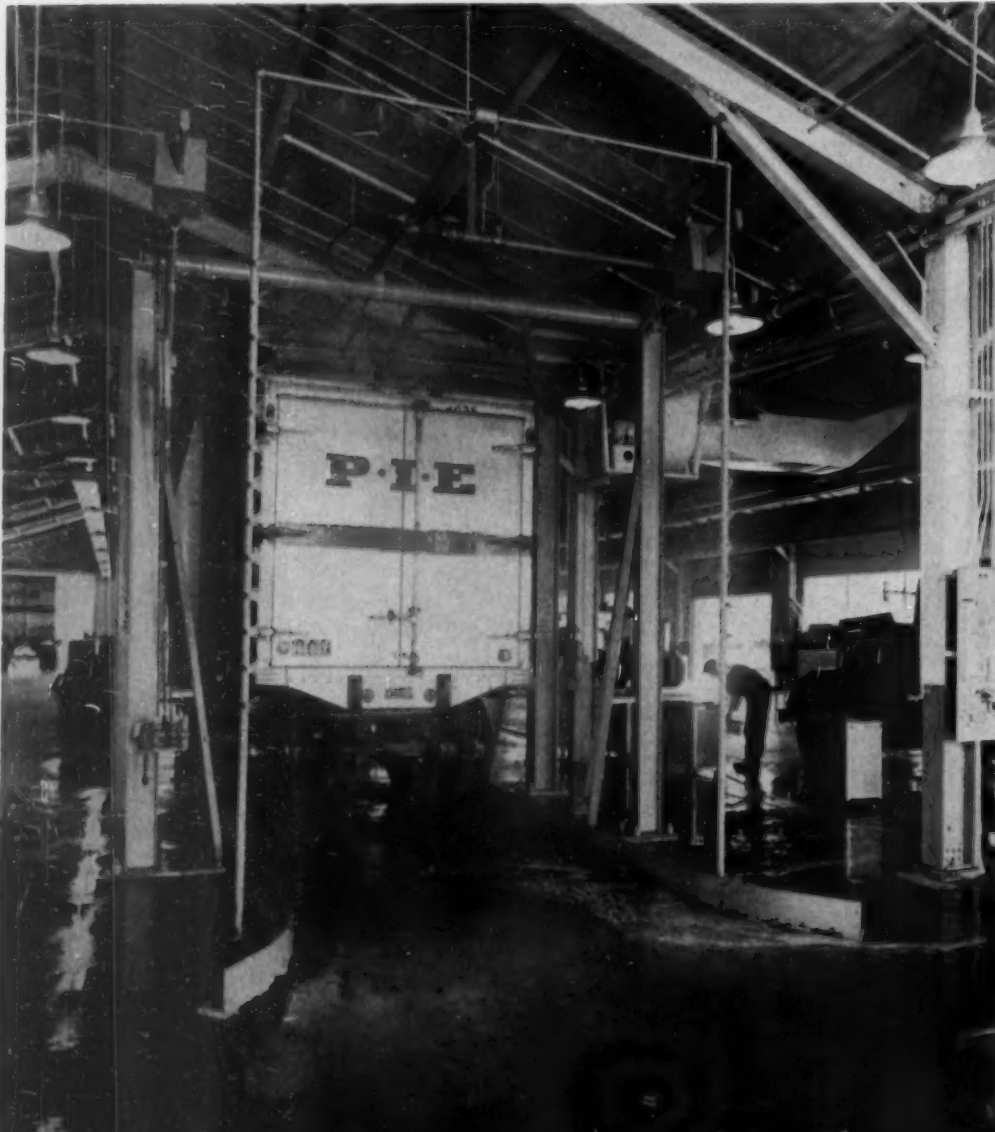




These Cummins and GM diesels have been completely torn down, overhauled, reassembled, checked and are ready to be returned to service. Note special cradles with wheels for easy moving.

Trailers pass through mechanical washing machine upon entering preventive maintenance line. Running gear is steam-cleaned at periodic intervals before body is run through machine.

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long inverted U-shaped ducts suspended from ceiling members directly above the inspection lines.

The third section of the Denver building, opposite from the maintenance lanes contains the paint spray room, tractor overhaul, trailer overhaul and unit rebuilding shops. The work done in this section can best be described as "a production line in reverse." At the present time, after a diesel engine has had 150,000 miles of road service, the tractor is scheduled for a complete overhaul. Units are removed from the chassis frame in major assemblies such as radiator and supports, engine and transmission, front axle with springs, rear axle bogie assembly with spring and cab. The stripped frame is inspected and repaired and new or re-built units are replaced on the tractor chassis. The complete overhaul job is turned out in about 48 hours, including painting. Used units which have been removed from tractors are torn down and rebuilt 100% in small unit rebuild areas in this part of the building. These include a room for overhauling fuel pumps and injectors and areas for rebuilding connecting rod and piston assemblies, electrical parts, etc. After the engines have been completely rebuilt, they are given a dynamometer check for performance and returned to the tractor build-up area ready for service again.

One of the more impressive pieces of modern equipment used in the overhaul shops section is a Vapor-Blast Liquid Honing machine which cleans carbon, rust and corrosion from pistons, cylinder liners, valves and small parts by a wet abrasive blast. This machine is best described as a large, enclosed work booth. A worker stands outside the booth and through special hand openings holds the



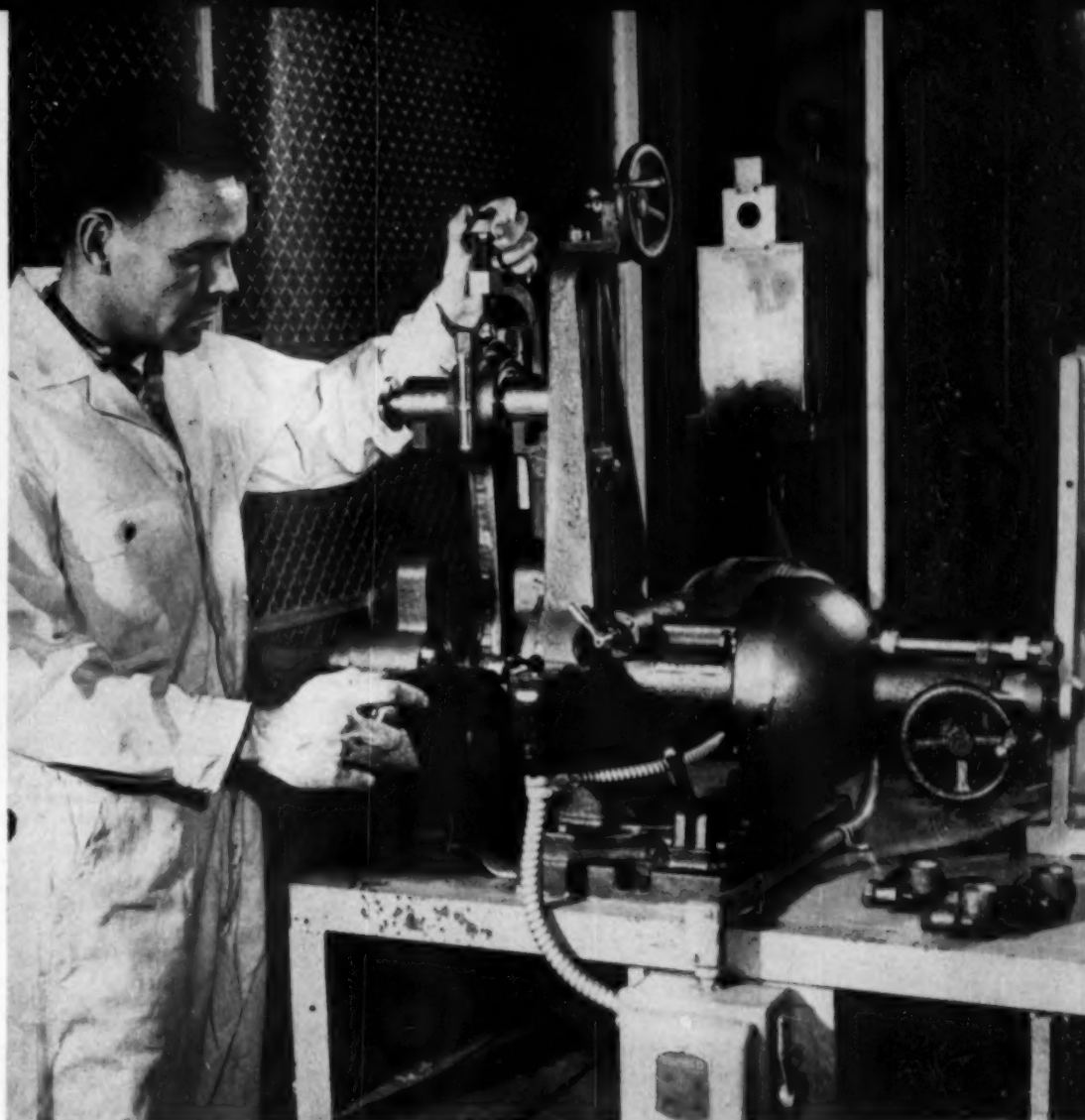
part and operates the air pressure gun while the cleaning is done inside the enclosure. A glass window at about eye level permits him to observe his actions inside. The cleaning solution, which is a mixture of abrasive and water, is contained in a tank under the booth and supplied through the air gun hose.

Another unique, and highly important, feature of P-I-E's maintenance shops in Denver is the complex card file which is kept on each piece of equipment. Detailed performance and cost figures are recorded on all operations and information is provided for determining the effectiveness of P-I-E's preventive maintenance program.

District service shops at Salt Lake City, Oakland, Los Angeles, Kansas City and Chicago are also maintained by P-I-E for making minor repairs and adjustments on line-haul units. In addition, these shops perform all service on local pick-up and delivery vehicles. J. W. Riesing, Director of Fleet Maintenance at Denver, is in charge of the more than 400 P-I-E service and maintenance personnel located at both the Denver Center and the several district service shops.

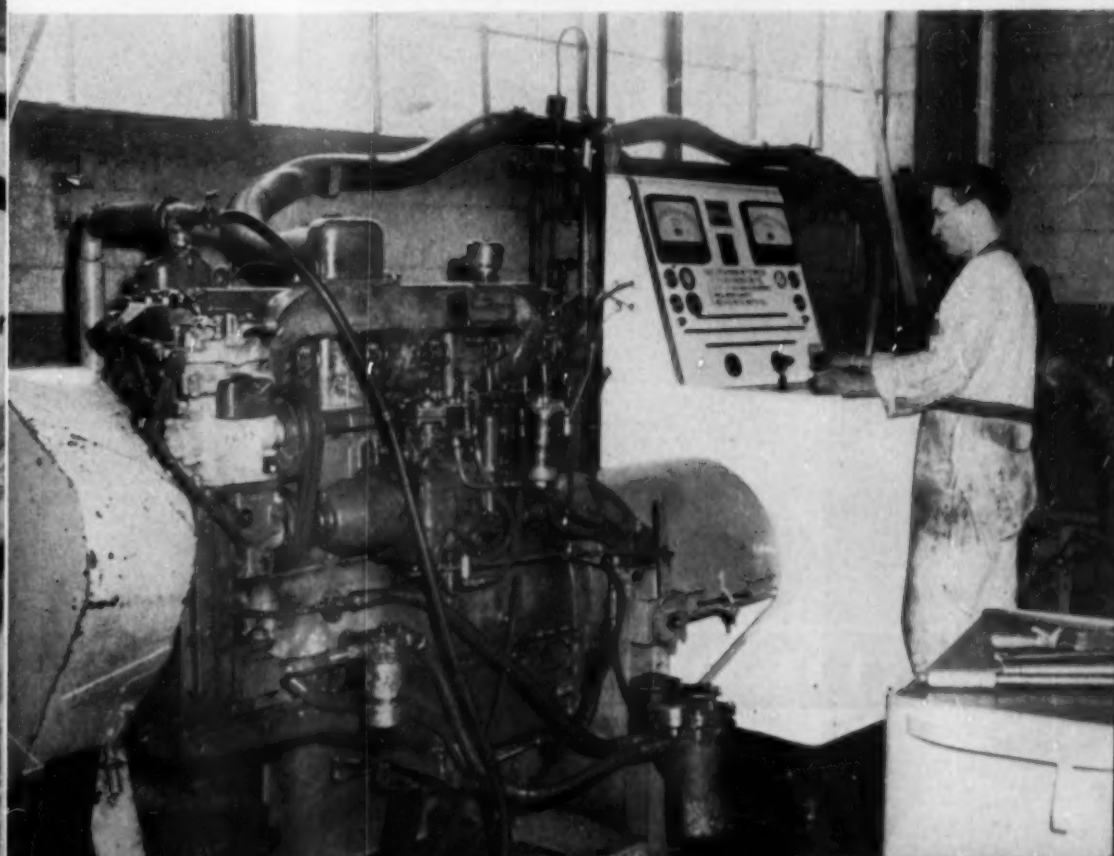
So there you have it. A modern miracle of equipment, plant layout and skilled personnel which, incidentally, has enabled P-I-E to win the Transport Topics Award for Truck Shop Excellence three years in succession already. And, to the writer, Pacific Intermountain Express doesn't appear to have any intentions of resting on their laurels—either now or in the future.

Aerial view of P-I-E's freight terminal (foreground) and general maintenance shops in Denver, Colorado.



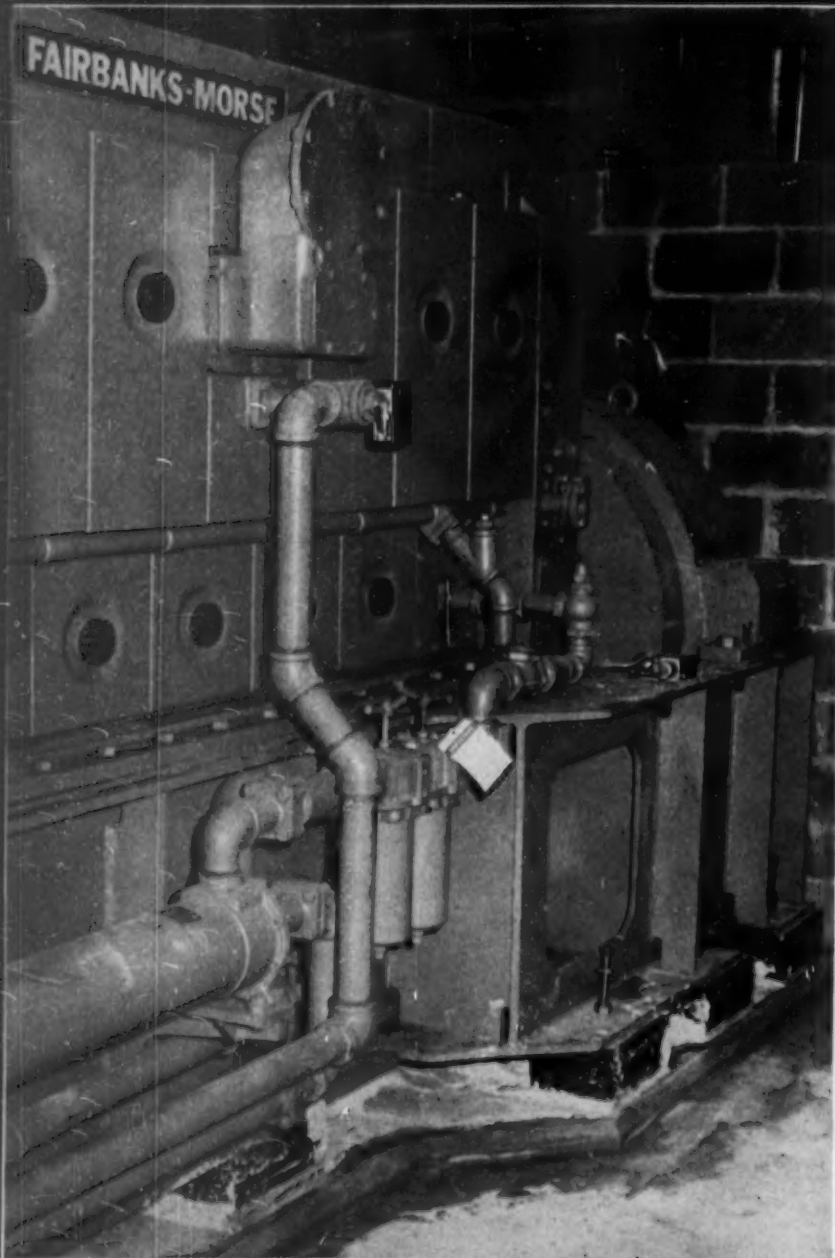
In the overhaul, or engine build-up section, of P-I-E's Denver shops, a Hydro-Borer machine is used for precision alignment of piston pin to piston and connecting rod.

Rebuilt engines are run-in for 8 hours on dynamometer to determine whether they will produce specified horsepower output under full load and speed conditions of highway driving.





Nearing completion is the new Carney Hospital and Nurses Home in Boston, Mass. It was designed by Maginnis & Walsh, architects. This new \$6 million building will have 315 beds, out-patient wing, laboratories, two chapels and promenade roofs.



Sold to M. B. Foster Electric Company for installation in the Carney Hospital is this Fairbanks-Morse 5-cylinder, Model 31-A-6 1/4 diesel with 125 kva., 100 kw. generator equipped for manual operation.



CIVIL DEFENSE IN NEW ENGLAND



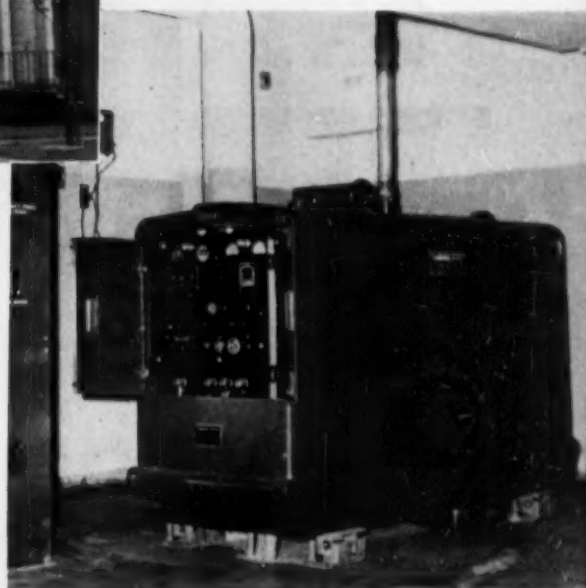
The new Memorial Building at Deerfield Academy and, below, the Fairbanks-Morse generating set sold to Collins Electric Company for installation in the building. The diesel is a 40 hp. Model 49-A-4½ with 25 kva., 20 kw. generator and fully automatic controls.

NEW ENGLAND VOTES DIESEL FOR EMERGENCY SERVICE

INVESTED with the custodianship of so many of the precious symbols of our Colonial history, New England through the years has made a habit of taking care of its heritage. This habit is easy to acquire when you find yourself charged with the responsibility of things like the Old North Church and the Concord Bridge, but New Englanders

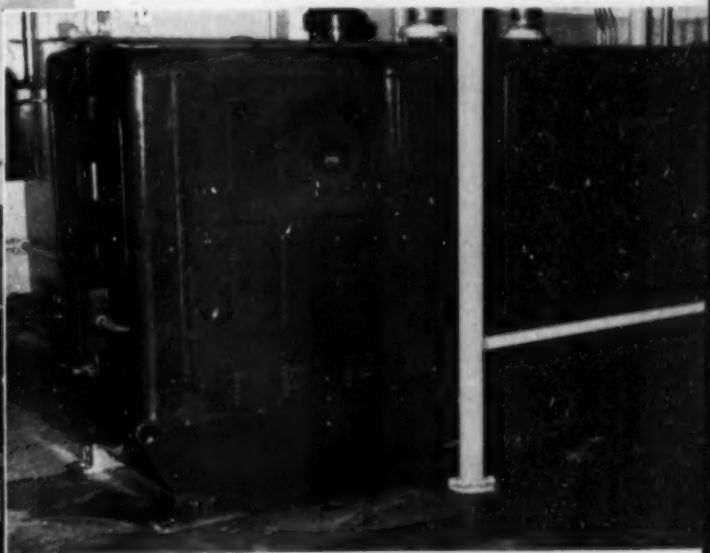
apply it today as well as yesterday—to people as well as to bricks and granite.

For instance, New England has pioneered in legislation to protect places of public assembly. The Commonwealth is presently peppered with diesel-electric generating sets standing by to supply emer-



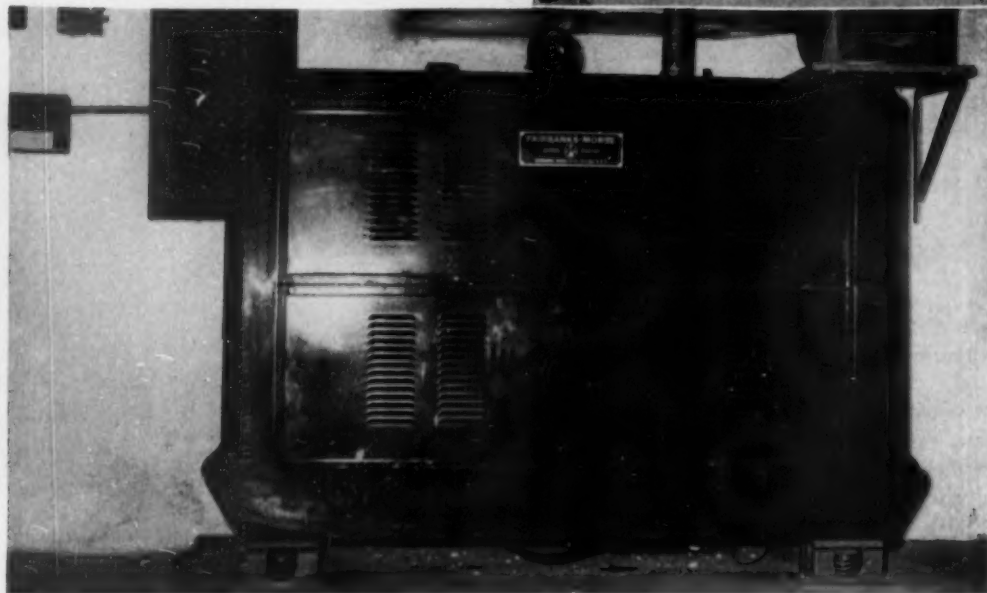
The home office of Providence Washington Insurance Companies at Providence, R.I. The building is protected by an emergency diesel generating set. Housed in the building is a collection of Currier & Ives originals and also a collection of model fire engines.

Protection for the home office of Providence Washington Insurance Companies is this Fairbanks-Morse Model 49-A-4½ diesel with 93.75 kva. generator and automatic starting and line transfer equipment. The diesel is rated at 120 hp.



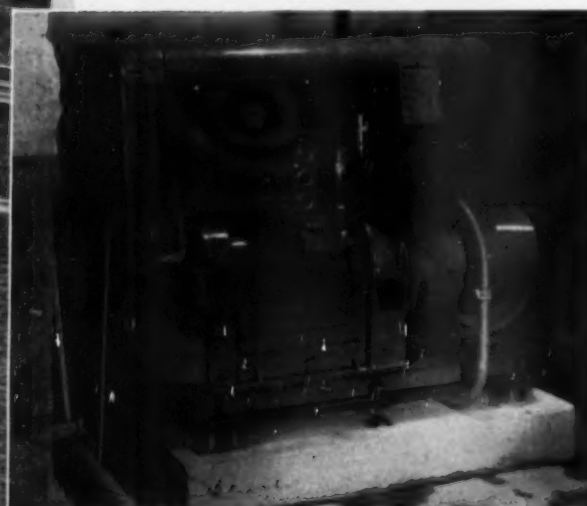
The efficient and ultra-modern home of Stations WNBH-WFMR at New Bedford, Mass. Uninterrupted broadcasting is assured by an F-M emergency diesel generating set.

Stations WNBH-WFMR's Fairbanks-Morse 20 hp. Fairbanks-Morse, 2-cylinder Model 49-A-4½, 12.5 kva., 10 kw., 3-phase, 60-cycle, 4-wire, 120/128-volt generator. The controls are fully automatic.

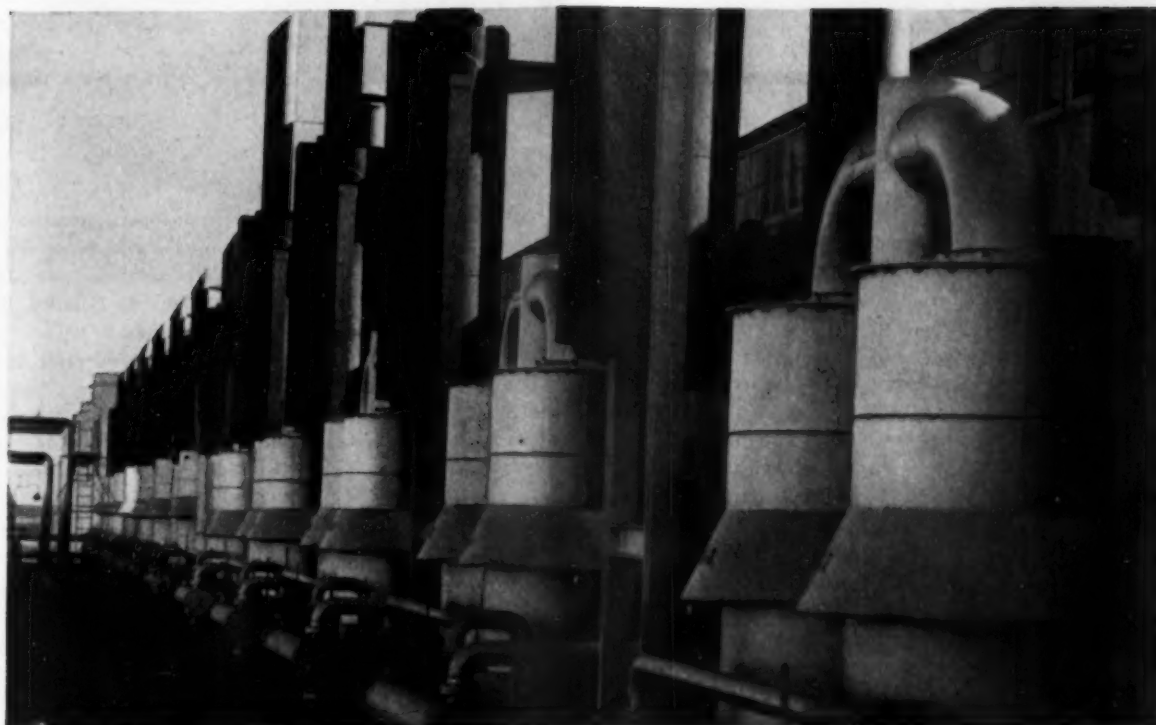


gency power to hospitals, schools and other public buildings when the vagaries of New England weather pull the switch on power from the high lines.

Pictured here are several of many institutions which have been provided with dieselized emergency power sources. Among them are hospitals, museums, radio stations, recreation centers and schools. In selecting such emergency generating sets, dependability is the key objective. Compactness and the ability to take over the load rapidly and, in most cases, automatically upon power failure from the regular source, makes diesel equipment ideal for emergency generating purposes.



Originally a theatre, the Leominster Recreation Center is assured uninterrupted use of its recreational facilities by a Fairbanks-Morse emergency diesel-electric generating set. It is a model 48-AG-4½ diesel, 25 hp. with 15 kw. generator and automatic controls.



Cycoil "lowers the boom" on **DUST**

Famous Oil Bath Air Cleaners Supply "Round the Clock" Protection For 17,750 Horsepower

Dust gets rough treatment at this Elk City, Okla. plant of Shell Petroleum. Standing guard at the air intake of each of 10 engines are two Cycoil Oil Bath Air Cleaners.

There's no compromise with perfection when Cycoil is on the job. It battles just as hard for the

last particle of dust as the first. The plan of attack is simple, logical and highly effective. First, intake air is thoroughly mixed with oil which traps over 90% of the dust content. Second, final cleaning action is then taken over by dual filter pads which capture the remaining 10%, consisting mostly of those "hard to get" fine dust particles.

Yes, Cycoils deliver approximately 100% clean air. If you settle for less you merely delay the inevitable—costly engine down-time and repairs due to that 2% or 3% of dust that "got by".

Write for AAF Bulletin No. 130. It gives you the "inside" facts on Cycoil design—tells you why this Oil Bath Air Cleaner has become the accepted standard for complete dust protection.



American Air Filter COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

S

Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

On the operation of diesel units, one is very likely to run into an out of the ordinary situation requiring considerable investigation on the part of the operating and maintenance personnel to determine the cause of said situation. We recently met up with one of these unusual situations and for the sake of our readers who might run into a like experience, we are passing it on for what it is worth.

In our plant we endeavor to give each unit a pretty thorough annual checkup and overhaul. The thoroughness of this checkup depends on plant load conditions and our ability to have outage for the units. In addition to this annual checkup we try to maintain a rigid program of preventive maintenance which lessens the outage for annual checkups, and at the same time keeps our units in as efficient operating condition as possible. One of the features of this preventive maintenance program is to take weekly cards from each cylinder on each engine, the primary purpose of which is to secure firing and compression pressures and to determine the differentiation between these two pressures on each cylinder of each unit. Diesel operators are aware that there is a certain relationship between these pressures, which if maintained on corresponding cylinders of a unit, will vitally effect the efficient operation of that unit.

One of the units in our plant is a six cylinder, crosshead type, air injection machine, of 2250 bhp. rating, driving a conventional 1500 kw. generator, 2300 volts, 60 cycle, 3 phase and feeding into the system. Over a period of years we have found on the above unit that if we can hold a difference between firing and compression pressure on each cylinder to approximately 100 pounds, plus or minus 10 percent leeway, with all other conditions being normal, we will obtain about as good efficiency as it is possible to get. In other words, we try to hold compression pressures around 525 pounds with firing pressures around 625 pounds at a given load of from 80 to 85 percent of rating. And let me mention in passing that when these cards are taken weekly, we endeavor to have load and operating conditions as nearly uniform week after week in order to eliminate some of the variables which might effect either compression or firing pressures or both. Of course, every diesel operator knows that there are variables which can affect either or both of these pressures, hence our endeavor to keep these conditions as uniform as possible when taking weekly cards. If we find an abnormal condition in one or more cylinder readings, we immediately endeavor to ascertain the cause and bring that reading back in line with readings from other unit cylinders. Now to explain the situation which we ran into.

One week early this spring we took a card from the six cylinders on the above mentioned unit with the results approximately as given in the following table:

Cylinder No.	1	2	3	4	5	6
Firing Pressure	630	620	625	640	625	625
Compression	525	520	530	530	520	525
Difference	105	100	95	110	105	100
Scavenging Air Temperature	55°F					
Load	80 percent of rating.					

This was an average card with average differentiation in readings and since we had installed new rings in pistons in No. 3 and 4 cylinders a few weeks previous, the compressions on these two pistons were a trifle higher than those pistons with older rings. The difference in firing pressures between these two cylinders could have been attributed to any one or a combination of several things, but since all readings were within the allowable 10 percent plus or minus range we were satisfied as the overall efficiency was up to standard.

For several weeks following the cards taken showed approximately the same relative readings cylinder for cylinder the ratio remaining approximately the same on the differentiation between pressures. About the fourth week after this we noticed a change. Cylinders 1 to 5 still maintained the proper ratio, but on cylinder No. 6 the firing pressure dropped to 605 pounds and the compression which was 530 pounds, gave us a differentiation of 75 pounds. This was not alarming, but was a trifle low for our set standard of operation. Therefore we investigated the cam setting to ascertain whether the cam had loosened up, checked the fuel pump for wear and slippage, inspected the atomizer and needle valve, checked the fuel check valve and the delivery valve. All of these parts were in good condition and the only item we found might have caused us difficulty was the delivery valve in the Bosch fuel pump. This was rather gummy and sticky so we cleaned the parts and installed a new delivery valve.

One thing that had happened was an increase in the scavenging air temperature, it now being approximately 80°F. This rise in air temperature naturally effected both pressures on all cylinders, but the ratio of difference between pressures remained about the same as in previous weeks. So after checking the aforementioned possibilities we operated the unit the following week and took the usual weekly cards from each cylinder. This card showed a drop of between 80 and 90 pounds, but all firing pressures were lower while compression

pressures remained approximately status quo. This we accounted for as being due to scavenging air temperatures which had risen into the 90°F range. However, No. 6 cylinder differentiation had dropped to around 50 pounds. Again we went over the unit, checked all cams, fuel pumps, delivery valves, rack rod settings, atomizers, needle valves, fuel lines, etc., and found them all in good condition, and could find no cause for this difference in No. 6 cylinder, which was due to an apparent drop in firing pressure on this cylinder since compression pressure remained right up with the other five cylinders.

The next step was to advance the blast pressure approximately 10 pounds at approximately 80 percent load and instead of carrying the usual 870 pounds of blast pressure we raised it to 880 pounds. This helped the situation all along the line, but No. 6 cylinder still lagged behind and was not up to normal. Then one of the operators advanced the cam setting on No. 6 just one degree. This should have made a difference of approximately 15 pounds in raising the firing pressure on this cylinder, but the actual result was that it raised it just 5 pounds.

We then came to the conclusion that we would have to look farther so pulled No. 6 piston and inspected it. Everything was in good shape, no rings broken, piston head okay, etc. The exhaust and intake ports were examined and while some deposit was noted, it was not enough to cause any trouble. We then pulled the two scavenging valves and here we found the source of our trouble, or at least the chief source of the trouble. These valves were pretty well clogged up, so much so that the valves were not opening properly. All twelve of the scavenging valves were then pulled and cleaned, but No. 6 was by far the dirtiest. Apparently these two valves which are at the end of the scavenging air intake header had accumulated more foreign matter than the other valves. This could easily be the case, since we have had a very dusty and dry year and with a large plant expansion program going on the air is continually filled with dust of all kinds. Even though this air is well filtered, some of it seeps through the filtering screen, as the filters on this unit are not the rotating type with the oil bath but a dry type of filter simply immersed in oil when cleaned. We have since inspected the scavenging valves on the units using the rotating filters with the oil bath and have found them very free from the dirt which had accumulated on the scavenging valves of the air injection engine.

When the next card was taken on this unit, every thing was back to normal and our out of the ordinary situation apparently was solved.

*Could you make this report about
your diesel engine?**

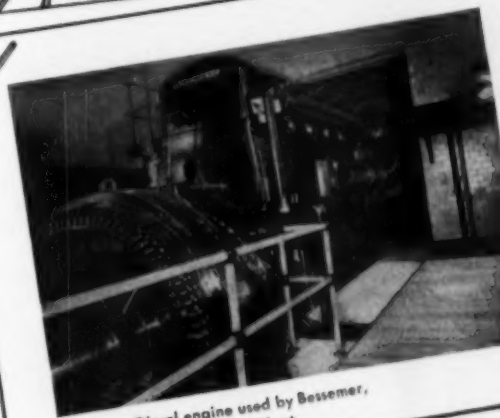
CITY OF BESSEMER, MICHIGAN REPORTS:

PISTONS PULLED AT 24,600 HOURS!

- All rings were free
- No carbon in ring grooves
- All original rings replaced in original grooves
- Rings should last at least 10,000 more hours
- Maximum cylinder wear was .004 at top, .002 at bottom

OIL CHANGE AT 5000 HOURS!

- No oil added to crankcase between changes
- Power cylinders fed at rate of 1 drop per minute
- Main bearing, rod bearings show very little wear
- Average K.W. per gallon of fuel is 13.5 @ 60% load factor



Nordberg Diesel engine used by Bessemer,
Michigan Municipal Power Plant.

EXCELLENT

Sam Zelenber

Superintendent,
Bessemer Light Utility.

Note:

FOR TOP ENGINE EFFICIENCY,
BESSEMER RELIES ON:

Cities Service DC-930 Oil used for crank-
case lubrication!

Cities Service DC-230 Oil used for power
cylinder lubrication!

* Why not contact your nearest Cities Ser-
vice Representative or write Cities Service
Oil Company, Dept. 18, Sixty Wall Tower,
New York City 5, New York.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS



Cummins & Moran reception room displaying a Cummins diesel. These engines have proved themselves over years of development in heavy trucking. This organization services the great strip mine trucks in Arizona.

DIESEL DEALERS SERVICE STRIPPERS

**Arizona Copper Mining Dares Engine-Powered
Equipment Men to Rugged Competition for Busi-
ness of Powering Mass Production of Low
Grade Ores**

By F. HAL HIGGINS

ARIZONA mining is enjoying the most highly competitive services of the best heavy equipment and diesel engineering in the world today. Grouped in Phoenix as a base from which to constantly contact the mine superintendents and their shop foremen and mechanics are as keen a group of competitive representatives of the diesel engine industry and the tractors, trucks and lesser equipment powered by diesels as the writer has ever encountered in his more than four decades of watching the mechanization of agriculture, logging, oil field, road and dam building. Usually, there has always been one outstanding manufacturer and his dealers in an area dominating the scene. Down here in the desert and mountains of Arizona mining has a background of centuries. Men and machines have been tested under blistering temperatures till they broke and failed. The survivors of the industry today present a rugged demand for bigger and faster machines to constantly increase

production and skilled labor's output to cut costs and enable the miners to work leaner ores than possible in the past. The fact that any engine or machine has stood up in the toughest proving grounds of the three big diesel engine builders that ring Phoenix is not enough. The proof of any firm's engines and equipment here is "can it do the job better on our mining operation than any other engines and equipment?" And that goes for methods as well as machines.

The writer saw no belts replacing the rugged diesel-powered trucks on any of the eight mines he visited. But there are railroads that haul from pit to dumps, though here again the diesel has moved into a job formerly done by steam and all railroad locomotives are diesel, diesel-electric and combinations for efficient handling of the trains of overburden and ore. As many as ten such trains representing three or four different manufacturers were



seen on one strip. Thus the visitor found open minds in the management of the mines as to equipment. In many cases three or four different makes of diesel engine were working side by side in trucks that were racing against time and production schedules up 6% pit bench grades to bring out 25 to 40 ton loads.

Oil field products—lubes, greases and fuels—were also in the strip battle. The strip mining as done today, like the highly mechanized farming and ranching of the West, fairly floats in oil. At every mine, one saw platforms covered with Standard, Texaco, General Petroleum and Shell drums parked on long platforms ready for the roving service trucks to load and carry out to the equipment on the job for regular service. Back in the research laboratories at Richmond, Martinez, and Southern California an army of researchers are constantly hunting and testing to give the diesel engines fuels and greases to meet the increasing demands put on them with each new model and bigger size. As Dr. Lazar, famous technician in the oil industry and

Mechanized mining floats in oil. Here a service truck loads Standard of California greases and oils at one mine's "grease house."



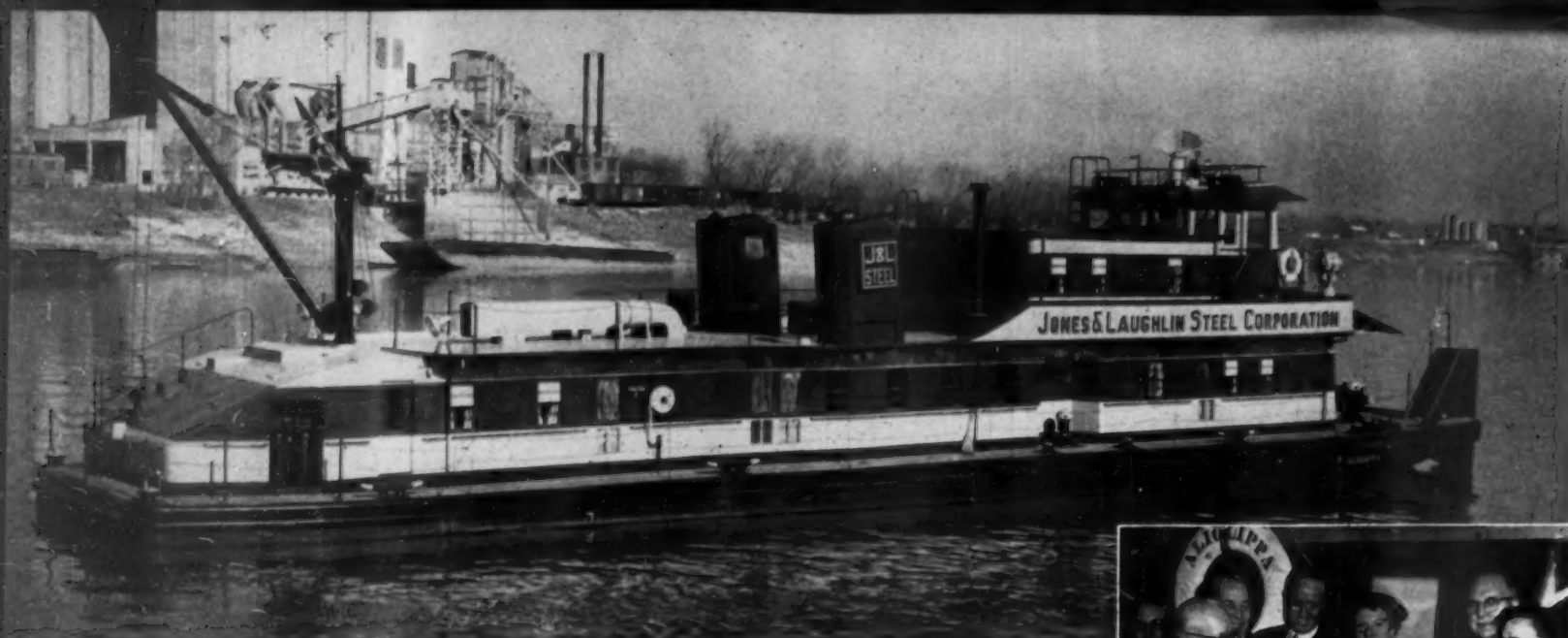
A Tournadozer driver stops to talk over its Buda diesel with Hans Bohuslav (left) formerly chief engineer of LeTourneau and new general manager of Michle-Dexter Supercharger Division. Harold Olson, partner of Arizona Equipment Sales, Inc. is to the right of Mr. Bohuslav. This Tournadozer features a Cuno oil filter, Perry water filter and Bendix air compressor.

formerly with Associated Tide Water Oil Co., when the writer interviewed him a few months back to learn what went on when the crisis of ring sticking and liner scoring and scratching threatened the high speed diesel engine's future back in 1935, each time a new and bigger engine comes out and whenever a new source of diesel fuel is called on to supply the widening and mushrooming diesel industry, there is a new problem for the oil industry to solve. But on the mines visited in Arizona at this time, the writer encountered no mention of oil problems. No technicians from the industry were encountered out on the jobs visited. That industry did its gigantic job back in the 1935-38 crisis and made possible the high speed diesel tractor in any area of the world, according to one "v-p" in the engine industry.

Rubber is another story. Here, again there is the roughest competition with Goodyear, Firestone, U. S. Seiberling, General, Goodrich all in the battle with the first two running neck-and-neck at one mine, Seiberling showing up best at another, and all in a wide-open free-for-all at still another. The big Tournadozers of R. G. LeTourneau at one mine will compel the tire engineers to develop something much better. The men in the shop at that mine where two of these machines were working remarked that the Tournadozer tire cost on that mine was running \$1 a mile per tire! Maybe Goodyear's new cold rubber that is being heralded as likely to have a life equal to the automobile on which it is put will get its chance on this equipment. The tire tests on these Arizona strip mines is no place for the panty-waisters. But Goodyear has been a pioneer in the Arizona desert and their testing fields, laboratories and farms that were taken away from the desert before World War I have given this old tire, belt and balloon builder a lot of experience on what it takes to beat desert sand and heat under any conditions. The engineers and technicians of all the rubber makers are on the mine job and working to lengthen the life of tires. They are proving they are doing it, too, say the mine shop men who say the number of recaps has risen to four where it used to be but one and then two. The miles operated under these heavy, high speed conditions of hauling up and down pit benches has doubled, said another mine superintendent as he opened his books to check. So, the heavy construction world is getting a lot out of

these strip mining operations that are getting the minute-man attention of a fine group of dealers with the manufacturers back of them giving instant attention to troubles that develop on the jobs where competition is constantly pressing to replace any engine, piece of equipment, tire, fuel or engine attachment that doesn't meet the demands of the mines.

Let's have a roll call of these Phoenix dealers who are servicing the diesels on strip mining, for that is the big test with the big reward that comes to the successful: Arizona Equipment Sales, Inc., with Harold Olson, Parts Mgr., giving constant attention to the mines; Buda Engines, LeTourneau line, P. & H. shovels, draglines, and cranes; Atlas Diesels, Universal Engineering Co., crushers and mills; Pettibone-Mulliken buckets, draglines, clam shells, shovels; Warner-Swasey Gradall construction machine; George Hais bucket loaders, conveyors and material handling equipment; OK Clutch & Machinery Co., hoists, air compressors; Twin Disc Clutch Co., power take-offs, hydraulic drives, reduction gears and torque converters; Winslow filters, etc.; Arizona Machinery Co., Caterpillar and John Deere full lines of tractors, engines, road and farm equipment; Cummins & Moran, Cummins diesel engines, with complete parts stock; Equipment Sales Co., Murphy diesel engines, Le Roi, Wisconsin and Onan engines, La Plant Choate, Link-Belt, Hyster lift trucks, Mixermobile, etc.; Engine Service, Inc., Hall-Scott natural gas and LP gas engines. (These LP 450 hp. engines power the Tournadozers seen on one strip mining job in Arizona); J. T. Jenkins Co., Continental Red Seal engines, O'Connell Bros., General Motors diesel industrial engines, Allison torque converters; Schuler & James, Inc., Hercules gas and diesel engines, power units, motors, etc.; State Tractor & Equipment Co., International tractors and power units, Adams graders and loaders, Hough loaders, Rex pumps, and concrete mixers, Ingersoll-Rand compressors, Barber-Greene bituminous asphalt equipment, Bucyrus-Erie tractor attachment equipment, Fairbanks-Morse Pomona pumps, Isaacson bulldozers and loaders, Drott bulldozers, Euclid trucks, etc.; Neil B. McGinnis Co., Allis-Chalmers tractors, crawler and wheel graders, LaPlante Choate scrapers; Waukesha Southwestern Engine Parts & Manufacturing Co., diesel, natural gas, butane and gasoline engines.



View of the *Aliquippa* ready for her trials. Right, the christening party. Front row, right to left, C. W. Gottschalk, assistant vice president, J & L Steel Corp.; the sponsor, Mrs. Gottschalk; Mrs. H. T. Pott. Back row, George Kuhlman, director of river transportation, J & L Steel Corp.; Chester M. Kuhns, J & L St. Louis district sales manager; Paul Tietjen, manager traffic and transportation division, J & L Steel Corp.; Mrs. C. M. Kuhns; and Herman T. Pott, president, St. Louis Shipbuilding & Steel Co.



M. V. "ALIQUIPPA"

DESTINED for the coal trade on the Monongahela and Ohio Rivers, is the powerful new diesel towboat *Aliquippa*. Designed and built by the St. Louis Shipbuilding & Steel Co., the *Aliquippa* was the first of three new boats being built for the Jones & Laughlin Steel Corporation of Pittsburgh, Pa.

The name *Aliquippa* is far from new on a river towboat. This latest craft of this name, a 1400 hp. twin screw dieselized vessel, replaces the venerable sternwheeler *Aliquippa*, which has been a familiar sight in the Pittsburgh area since 1914. The old sternwheel steamer went to the graveyard in 1952. The new towboat is 116 ft. in length by 27 ft. in breadth with a normal draft of 6 ft. 6 in. The sturdy hull is framed on the transverse and longitudinal system and is built to the highest river classification of the American Bureau of Shipping. The combination of the highly developed stern lines, the specially designed Kort nozzles and the Contra-guide rudders gives the 1400 hp. *Aliquippa* the pushing power of the ordinary 1800 hp. towboat.

Propulsion is provided by two Superior Model 40-S2X-8, 8-cylinder, supercharged, 8½ in. by 10½ in. diesels. Each engine is rated at 700 hp. at 800 rpm. Through Falk special reverse and reduction gears with 3.034:1 ratio, the 74 in. diameter, four-blade manganese bronze propellers turn at 266

rpm. Each propeller is shrouded by a specially designed Kort nozzle. The main engines and reduction gears are completely controlled from the pilot house through Westinghouse pneumatic controls. Electric power is provided by two GM 60 kw., 120/208 volt ac. diesel generator sets.

The spacious pilot house affords clear vision, in all directions. The pilot house console houses the engine and clutch control levers and two pairs of steering levers, affording the pilot complete control of the vessel at all times. The ship is equipped with radar and radio-telephone. The *Aliquippa* along with its sister ships the *Vulcan* and the *Titan* joins the *W. J. Kearns* which was recently completed for the modernized Jones & Laughlin river fleet.

List of Equipment

Main engines—Two Superior Model 40-S2X-8, 8-cyl. supercharged, 8½ x 10½, each rated at 700 hp. at 800 rpm.
Auxiliary generator sets—GM Detroit Diesel Div. Two, each 60 kw., 120/208 volts ac.
Exhaust silencers—Burgess-Manning.
Pilot house controls—Westinghouse Air Brake.
Lube oil coolers—Ross.
Lube oil purifiers—Hilco.
Fuel oil filters—Brigsg.
Jacket water coolers—Graham.
Fuel oil service pump—Viking.
Air compressors—Gardner-Denver.



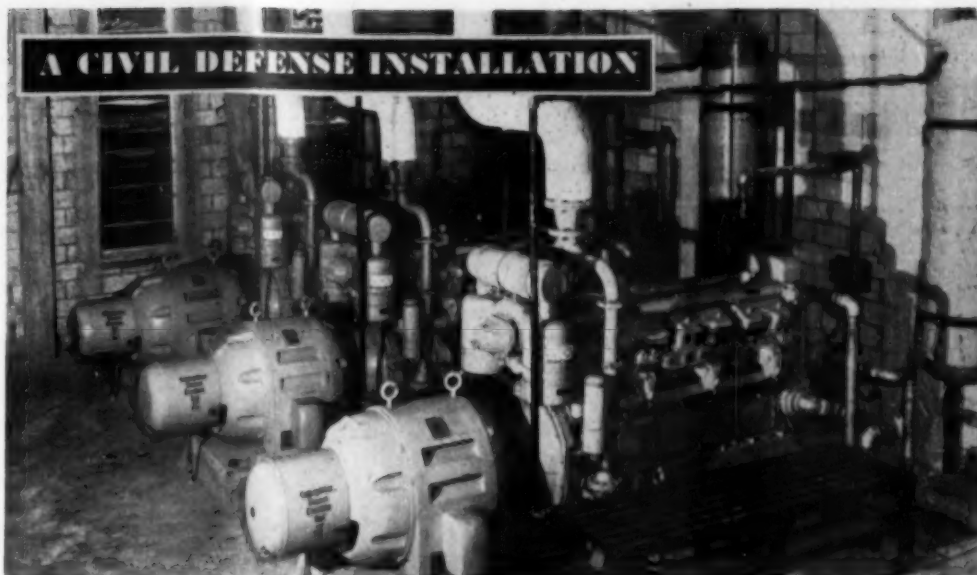
The General Motors 60 kw. generator set.

View of the lower engine room on the *Aliquippa* showing the Superior propulsion units.

HOSPITAL INSURANCE

ANGELS of Mercy is what the doctors and hospital officials call the recently installed diesel power plant at Jackson Memorial Hospital, operated by Dade County, Florida.

As power from the regular utility company is not always available, especially during hurricanes, the Dade County Commissioners decided to install a dependable emergency diesel generating plant and secured three model D 397 Caterpillar diesel engines rated at 450 hp. ach, from Shelly Tractor & Equipment Co., Miami, Fla. The General Electric generators are rated at 315 kw. each; other specifications of this fine installation are Ross heat exchangers, individual cooling water wells, Maxim MU3 mufflers take care of the noise and exhaust. The Westinghouse switchboard and controls were supplied by the Tampa Armature Works of Florida. The foundation is of poured concrete and the compressed air problems are solved with an Ingersoll Rand air compressor.



The emergency power plant engineered by Shelly Tractor and Equipment of Miami, at Jackson Memorial Hospital; 3 model D 397 Caterpillar diesels with 315 kw. General Electric generators, Ross heat exchangers and Maxim mufflers.

Comparison Operating Data—Certain REA-Financed Internal Combustion Generating Plants May 1953

Plant No.	Size kw.	Gross Generation M KWH	Sta. Ser. %	Plant Factor %	R P C Factor %	Fuel-Cost		BTU per KWH	HP/Hrs. per Gal. Lube	Man-hrs. Labor Oper.	Labor Maint.	Maint. \$	Production Costs Mills/Net KWH				BEST OF THE MONTH Total BTU/KWH
						Oil \$/gal.	Gas \$/MCF						Labor	Fuel	Others	Total	
7B.	4,600	1,342.0	3.2	39.4	69.0	11.04	-----	9771	13,740	897	31	6.70	.96	8.08	.18	9.22	9771
17B.	3,939	321.6	2.9	45.1	63.8	9.53	-----	9787	7,998	774	317	311.93	1.68	6.97	.46	9.11	9787
18.	3,475	1,097.6	4.1	42.4	81.5	9.22	-----	9775	2,954	1031	1	8.27	1.45	6.76	.54	8.75	9775
23.	6,525	1,339.4	4.1	27.6	58.7	10.46	-----	9871	13,760	959	291	-----	1.64	7.41	.29	9.34	9871
25.	9,404	3,052.0	4.3	45.1	89.5	10.31	31.02	9711	6,754	1826	835	569.95	1.36	3.50	.50	5.36	9711



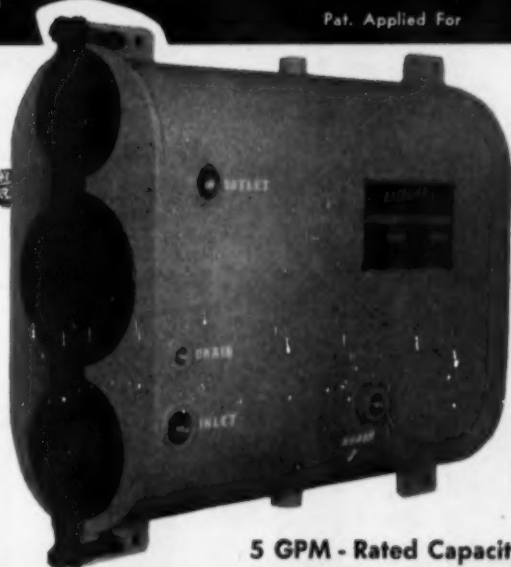
INTRODUCING
to the railroad industry,
the NEW....

EXCEL-SO FEQ-5

COMBINATION WATER SEPARATOR, MICRONIC FILTER FOR DIESEL FUEL.....

Stop injector corrosion, erosion, wear and tear, and seizures caused by water and dirt in diesel fuel. . . . This new combination separator-filter is installed directly on the fuel supply to injectors on diesel locomotives, to assure effluent purity of stream to 99.995% and to remove water and solids down to 5 microns at 35 - 45 F. Cuts maintenance costs, down-time and expensive injector overhaul due to contaminated fuel. One injector change costs more than the FEQ-5 and its installation. Takes up a minimum of space (22" x 18" x 8"), cast aluminum construction, universal mounting brackets, standard connections.

See it at the Railroad Supply Convention in Chicago.
September 14 - 17, Booth 178-A



5 GPM - Rated Capacity

WARNER LEWIS COMPANY

BOX 3096 • TULSA, OKLAHOMA

WOMAN HEADS "HE-MAN" BUSINESS



Lubaid-D, Liquid Sootout, Tankwash and 23 automotive products are manufactured in this modern fireproof building.



Mrs. Leo J. Sauerborn

The only woman president of a chemical firm engaged in what is generally regarded as strictly a "he-man's field" is Mrs. Leo J. "Van" Sauerborn. Her accomplishments as executive head of the Lubaid and Zecol, Inc. of Milwaukee might well be written under the title "The wife who was taught to become a Successful Widow." Her late husband's business lessons were hard to learn and the educational process took many years. But to prove how well they paid off, we need only to point out that Mrs. Sauerborn has built her company into a million dollar industrial, marine and automotive chemical business that is still growing. Hers is an inspiring story of American enterprise and effort. It starts with a wife's decision to help

promote her husband's chemical business during the depression, through the use of mail order.

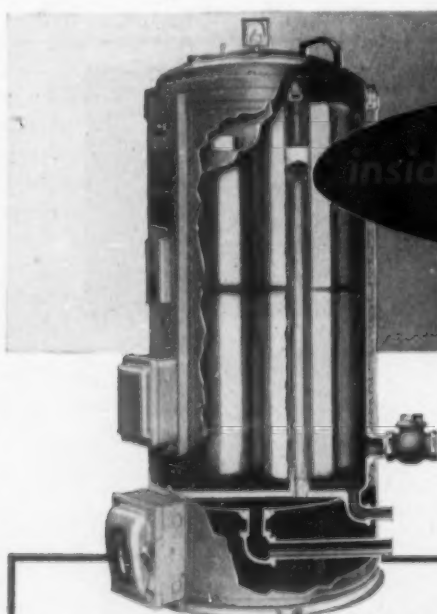
With her husband in 1932, Mrs. Sauerborn founded Zecol, Inc., which was engaged in the manufacture of only one chemical product in a small rented building. This was a far cry from the modern, two-story concrete block building the firm now occupies in the southeastern industrial section of Milwaukee, Wisconsin. This fireproof building has the latest chemical processing equipment in its fluorescent-lighted plant. The building was a dream of Leo J. Sauerborn, president of the company until his sudden, untimely death by a heart attack in January, 1950. Shortly after his death the Lubaid Company moved into its new quarters.

In 1940 the formula for liquid Sootout was developed, and Mrs. Sauerborn states that since that time, the Lubaid Company has become one of the leading marine and industrial chemical manufacturers in the United States. The Lubaid Company was the pioneer of the fuel oil additive field and the first to successfully combine the qualities of good sludge dispersion with combustion area cleaning action into one product. Hence the phrase "Liquid Sootout, the original dual fuel oil treatment that gives constant cleaning action from tank to stack." This liquid chemical when added to fuel oil, aids in protecting the fuel oil system against formation of sludge and at the same time has a

cleaning action in the combustion and superheater areas as well as in the economizers and air preheaters. "Its main effectiveness is in the gaseous state at the peak temperature of combustion" is not a phrase easily tossed off by the average woman, but to Mrs. Vanda Sauerborn, who is known as "Van" to her many friends and business associates, it is explained just as easily and quickly as she adds, "Liquid Sootout is used by many of the major steamship lines and large industrial concerns."

The success of Liquid Sootout prompted her husband, Leo Sauerborn, to explore allied product uses. A long period of research and field testing led to Lubaid-D, a successful additive for diesel engine use. One of the world's largest diesel electric plants operates more efficiently today through the use of Lubaid-D. This is an additive for diesel fuel oil which aids in dispersing gums, sludge and varnish, achieves free pumping, maintains maximum compression pressures, aids cleaner combustion and reduces port clogging and sticking valves.

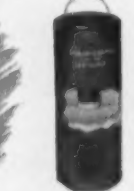
Mrs. Sauerborn has come far to become president and owner of an important chemical firm. Some 3,500 distributors and sales representatives handle the firm's industrial, marine and automotive products. Warehouses located in all principal port cities stock Lubaid products. In addition, Zecol, Inc. manufacture twenty-three different automotive chemical products, the third largest line in America.



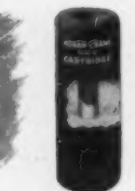
INTERCHANGEABLE CARTRIDGES FOR HONAN-CRANE PURIFIER



TYPE "MC"—Cotton bag packed with Cranite (fuller's earth). Removes solids and products of oxidation... acids, gums, etc. Provides refinery-type purification.



TYPE "MF"—Perforated metal basket packed with Palconia (cellulose fiber). Recommended for additive oils for complete removal of dirt, scale and other solids.



TYPE "S"—Contains Palconia (cellulose fiber). Performs same as Type "MF." Fiber center-tube permits complete disposal of spent cartridge by burning.



TYPE "E"—Similar to Type "S" except that filtering material is cotton waste and excelsior. Type "E" is recommended when water is encountered in the oil.

The Honan-Crane "Multi-Cartridge" Purifier is engineered, inside and out, to provide the high-flow, thorough oil purification essential for diesels. Removes all types of harmful contamination . . . substantially reduces engine wear and maintenance costs . . . quickly pays for itself in oil savings alone!

Here are a few of the time-tested features that make Honan-Crane preferred for safety and savings wherever diesels are used

WRITE US ABOUT YOUR OIL PURIFICATION PROBLEM

Honan-Crane Fuel and Lube Oil Purifiers are available for any size or make of Diesel Engine. For detailed information, write Honan-Crane giving make, model and H.P. of your diesel. Describe any unusual aspects of your oil purification problem.



HONAN-CRANE CORPORATION
202 Indianapolis Avenue, Lebanon, Indiana
A Subsidiary of
HOUDAILLE-HERSHEY CORP.

only **HONAN-CRANE**
... **DIESEL OIL PURIFIERS** give you so many vital
ENGINEERING FEATURES

- 1 Cartridges are readily interchangeable to provide type and degree of purification required.
- 2 Clean oil is drawn from top of purifier. Maximum efficiency of each cartridge is utilized.
- 3 Cartridge design prevents channeling or by-passing. Multiple units provide high flow rate.
- 4 Electric heater bands maintain correct oil temperature. Steam, hot water heating available.
- 5 Oil-and-gas-tight seals and gaskets prevent seepage. Dirty oil cannot contaminate clean oil.
- 6 Double-decked cartridges save floor space, permit clean design, greater operating efficiency.
- 7 Positive locks and pressure springs keep cartridges securely in place, prevent by-passing.
- 8 Purifier is fully equipped with automatic controls and safety features. Requires no attention.

Vacuum Leak Detectors



A new series of Junior Vacuum leak detectors have been added to the Whittington Pump & Engineering Corporation's line of production vacuum testing equipment. These new leak detectors feature the basic principles of vacuum testing. They are versatile and designed for many applications. Applications cover a wide range of parts which are to be fluid or air tight. Small parts such as castings, weldments, and assemblies can be tested. Dry, non-destructive, fast and efficient testing has been realized in many industries. The Junior line is designed for bench location and is supplied with vacuum pumps built into the unit or engineered to fit the application. The units are offered in manually operated, semi-automatic or automatic models providing units suitable for laboratory and random testing to production testing with "green" and "red" lights indicating test conditions. They can be made completely automatic, requiring no operator, in some applications.

Other units of the line are designed to indicate rate of leak and for measuring flatness of highly finished surfaces. Valves in internal engines can be tested as well as rate of flow through orifices. A unique vernier method using vacuum gives surprising accuracy in indication of flow conditions in small openings. Water jet type of vacuum pumps capable of pumping vacuum to 28 inches mercury, sizes 1/2 hp. to 100 hp. supplement this line. For complete information write the company at 1126 Prospect St., Indianapolis 3, Indiana.

Acquires Jacobs Mfg. Co.

Chicago Pneumatic Tool announces that it has acquired the assets of The Jacobs Manufacturing Company of West Hartford, Connecticut, manufacturers of the world famous Jacobs Chucks. Manufacturing and sales operations will not be affected by the sale and will be carried on without change by a new wholly owned subsidiary of The Chicago Pneumatic Tool Company called The Jacobs Manufacturing Company (a New Jersey Corporation). Present personnel and company policies will not be altered.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

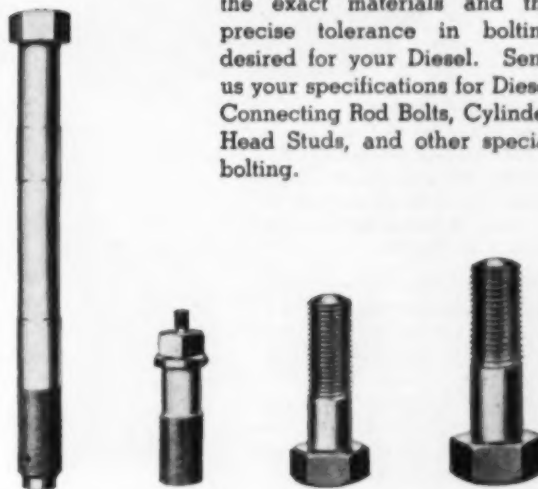
SEPTEMBER 1953

For DEPENDABILITY IN CONSTRUCTION EQUIPMENT



The Correct Fastener for the Job

For over 38 years Erie has manufactured bolts and studs to the specifications of Diesel Engine builders. This specialized experience gained in working with leading Diesel designing engineers assures you of getting the exact materials and the precise tolerance in bolting desired for your Diesel. Send us your specifications for Diesel Connecting Rod Bolts, Cylinder Head Studs, and other special bolting.



ERIE BOLT and NUT CO.

ERIE • PENNSYLVANIA

STUDS • BOLTS • NUTS
ALLOYS • STAINLESS
CARBON • BRONZE

Representatives in Principal Cities.

Mexican Distributor



Daniel M. Booth

Daniel M. Booth, a resident of Mexico City since 1930, has been appointed distributor for the Engine Division of The National Supply Co. Through a newly-formed company, Consultores y Abastecedores Industriales, S. A., Dolores 17-301, Mexico D. F., he will handle the sale of National Supply's Superior and Atlas diesel engines throughout Mexico, except in Nayarit and Baja California and the State of Sonora. The com-

pany will also handle other machinery and equipment. Mr. Booth previously served as branch manager of the Worthington Corp. in Mexico City and later was manager of the Mexican subsidiary of the Nordberg Manufacturing Co. He has had considerable experience in the sale of diesel engines and other equipment. He is a graduate of the University of Alabama and Cornell University. He has a bachelor of science degree in electrical engineering and also completed graduate work in mechanical engineering.

Export Model Locomotives

Two new export model diesel locomotives—the "G" series and the "R"—were introduced to for-

eign railroad representatives by Electro-Motive Division, General Motors, at the Quinquennial Convention of the Railway Supply Manufacturers Association, Atlantic City, N. J., recently. The new locomotives, which complement the full line of General Motors' domestic diesel locomotives, were exhibited in scale model form in the Electro-Motive exhibit in Convention Hall, along with a scale model of the export model "B," 1125 horsepower streamliner road locomotive unit. An actual unit of this model also was exhibited in the outdoor track display.

The model "G" locomotive, a smaller version of the 1500 horsepower General Motors GP-7, domestic all-purpose road switching locomotive, can use either the eight cylinder or twelve cylinder General Motors 567 series two-cycle diesel engine, providing locomotive units of either 750 or 1125 horsepower. This locomotive, by using four or six wheel trucks, can provide axle loadings from 11 to 16 tons—to achieve maximum weight on drivers while keeping within the limits of light rail. The locomotive can be constructed to operate on all track gauges from one meter up to five feet, six inches. All types of coupling can be applied. Only twelve feet, two inches in height and nine feet wide, this locomotive meets restricted clearances found on many foreign railroads. The model "R" locomotive is the commercial version of the General Motors MRS-1, military road switcher locomotive now being used by the Army Transportation Corps in Korea and Europe.

The model "R" is a six-motor locomotive of 1500 horsepower with a thirteen foot six inch clearance and an 18½ ton axle load. It can be constructed also to operate on track gauges varying from one meter to five feet six inches. Because of its high horsepower rating, this locomotive is expected to find wide application on South American railroads. All three export locomotives use standard domestic General Motors components, two-cycle, 567 series diesel engine, generators, and traction motors, proven in the toughest service on North American railroads for almost twenty years. Traction motors are available for either standard or narrow gauge widths. Use of the 567 engine not only provides maximum parts interchangeability but makes available to these locomotives all of the advantages of the 567, long parts life, low parts cost, and ease of inspection.

Lucky Dog



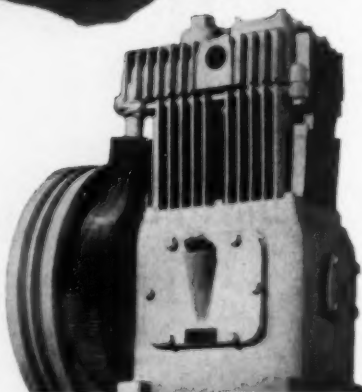
Lovely Loraine Roberts was the lucky winner of "Beau Mack," English bulldog pup given away by the Mack Truck Company at the California Motor Truck Association's annual meeting earlier this year. She attended the meeting with her father, Mr. Ed Roberts, president of the Roberts Tank Lines, Los Angeles. Miss Roberts and "Beau" are standing in front of the new Mack Model W-71, cab-over-engine, diesel tractor for western operations which was introduced at the meeting.

**LIKE A
DUCK TAKES
TO WATER**



... Quincy Compressors take to any job that calls for **DEPENDABLE** compressed air supply. Modern, compact, rugged Quincy Compressors are built in a variety of mountings; sizes from 1 to 90 c.f.m.

There's a Quincy for you! Let a Quincy specialist help you select the type and size Quincy Compressor to fit your specific needs. Look over the Quincy line in complete line catalog that's yours by writing Dept. K-32.



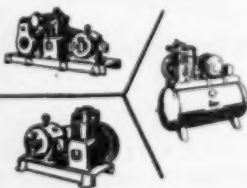
YOU CAN DEPEND ON

Quincy
COMPRESSORS

QUINCY COMPRESSOR CO.
QUINCY, ILLINOIS

Branch Offices: New York • Philadelphia • Detroit • Chicago
St. Louis • Dallas • San Francisco

Manufacturers of Air Compressors Exclusively



New Gage Samples Bottom Content Of Liquid Storage Tanks



Illustration shows the new Visa-Test Gage which is fastened permanently to the end of the standard liquid storage tank measuring stick. Purpose of the gage is to obtain an exact sample of the bottom content of the tank. The Visa-Test Gage shows an accurate cross-section measurement of the water, sludge and other foreign matter which may be drawn by the suction line. Trip valve closes upon contact with bottom of tank permitting content sample to be raised and examined. Component parts are not affected by any petroleum product.

Measurement tape in tube is printed in white plastic and coated with clear plastic preventing discoloration or fading. The instrument is fully guaranteed for one year against breakage or leakage. For information, write Visa-Test Sales Co., 1515 Alturas Drive, Burlingame, Calif.

Honan-Crane Appointment



Carl F. Holland

Carl F. Holland has joined the Columbus, Ohio office of the Honan-Crane Corporation as sales engineer for the central Ohio and western West Virginia territory. Announcement of his appointment was made by D. J. Jones, Honan-Crane manager. Mr. Holland attended Ohio State University and was formerly associated with the Standard Paper Company and the Sherwin-Williams Paint Company. Honan-Crane is a leading manufacturer of oil filters, oil and coolant clarifiers and automatic materials-handling conveyors. Home offices are in Lebanon, Indiana.

Catalog on Equipment for Materials Handling

New methods in bulk and packaged materials handling that reduce operating costs for industry are pictorially described in the new 12-page "Modern Materials Handling" market brochure by the Tractor Division of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Illustrating the brochure are action shots of crawler and industrial wheel tractors, motor graders, and power units, plus detail views of the rubber-tired earth moving equipment recently added to the A-C line. Versatility and flexibility of the equipment in operation above or underground is emphasized by these "on-the-job" pictures. They show handling of mail and other freight in rail yards; log hauling from forest to mill; stockpiling cut lumber; handling and disposing refuse for sanitary landfill operations; coal stockpiling; underground mining for such materials as uranium, salt, and various ores; and many other important industrial materials handling jobs. Emphasized is the importance of mechanized mate-

rials handling in releasing for industry valuable manpower for other productive work. Capacity, horsepower, weight and other basic data on Allis-Chalmers equipment and necessary attachments is included.

Appointed Distributor

Appointment of Gochenaur Marine Company, Philadelphia, Pennsylvania, as distributor in eastern Pennsylvania, southern New Jersey, and Delaware, for 4FS diesel engines has been announced by the Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. Gochenaur Marine Company is located at 229 South Fifth Street, in the heart of

Philadelphia, where modern showrooms and service facilities and a completely equipped machine shop are maintained. Nordberg 4FS four cycle engines ranging from 10 to 45 hp. will be added to their present lines which include Nordberg gasoline marine engines, Michigan propellers, International Marine paints, and others. Nordberg 4FS diesel engines are offered in one, two, and three cylinder models with $4\frac{1}{2}$ in. bore and $5\frac{1}{4}$ in. stroke, for operation at 1200 to 180 rpm. They are offered as complete, self contained, ready to operate generator sets, centrifugal pump units, and with clutch or stub shaft power takeoff to meet the varied demands for compact, economical units of low horsepower.



**WOULD YOU CLEAN
ONLY PART OF
YOUR FACE?**

No, of course, you wouldn't!
Then why clean only *part* of the
oil in your engine? Why
be satisfied with anything less than
the best protection you can give
your engine's moving parts?
Keep *all* your oil clean, and
all the moving parts of your en-
gine protected, with warranted
Winslow Full-Flow Filters!



WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

WASHO Conference



Mark U. Watrous

Long the focal point of historic trails it seems particularly fitting that the thirty-second annual conference for Western Association of State Highway Officials should occur in Santa Fe, New Mexico, October 7, 8, 9, 10, 1953. Welcomed will be some 120 official delegates from 12 western states, the territories of Hawaii and Alaska, the U. S. Bureau of Public Roads and the U. S. Forest and National Park Services. Suppliers'

representatives, and representatives of the Association of General Contractors, the Asphalt Institute and Portland Cement Association will be present.

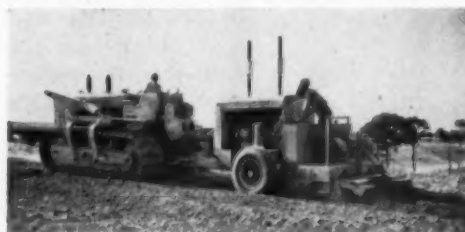
A comprehensive technical program is planned, open to change as to subject matter and personnel. Many recreational and social events are on the agenda. One of the major addresses scheduled is to be given by an official of the Bureau of Public Roads, Washington, D.C. There will also be exhibits, and the \$500 Dr. L. J. Hewes Award will be offered to the most outstanding engineer. Registration begins the afternoon of Tuesday, October 6, at Hotel La Fonda, continuing through Wednesday morning with coffee for guests. The first general assembly occurs October 7, 9 a.m., at the Capi-

tol Building where all ensuing sessions will be held. Presiding will be Mark U. Watrous, president of WASHO and chief highway engineer for the State of Colorado.

Calculator for Shell and Tube Type Heat Exchangers

A heat exchanger calculator for use in the selection of shell-and-tube type heat exchangers manufactured by the Young Radiator Co., Racine, Wis., and Mattoon, Ill., is available upon request, through the company's heat exchanger sales representatives. Designed like a slide rule, the handy 2-color calculator provides all necessary data and simplifies Young Heat Exchanger selection. Essentially, the calculator is used to determine the square feet of surface necessary to transfer a given amount of heat between oil or water on the shell side, and water on the tube side. It is applicable to the complete line of Young standardized shell-and-tube single and multipass, fixed and removable tube bundle units. The Young Calculators are packaged in an attractive folder and protective envelope, complete with simplified operating instructions including tables of tube surface areas measured in square feet.

Mixing Layers of Road Fill



A new and faster method of mixing layers of fill which will prevent pavement damage due to uneven settling is being used by R. H. Wright and Sons, Uleta, Florida, on their contract to modernize 7 miles of Route 9 at the northern outskirts of Miami. Using an International TD-24 crawler tractor for the towing unit, fill is mixed in six-foot widths to a depth of 12 feet by a Woods Pulvi-Mixer, powered by an International UD-24 diesel engine. In placing the fill for the two 100-foot approaches to a clover-leaf where Route 9 crosses U. S. 441 and the Seaboard Airline Railroad tracks, the mixer took only 1/2 hour to cover each approach one time. Previous methods required about 10 hours. In addition to fill mixing, the unit is being used to mix subgrade and base for the entire 7 miles of the mall-divided four-lane pavement.

Appointed Advertising Manager



John T. Davis

Appointment of John T. Davis as advertising manager for Kent-Moore Organization, Inc. is announced by J. D. Adair, president. The company is a leading manufacturer of special purpose service tools and equipment, used throughout the world by automobile dealerships, garages, service stations and fleets.



D-X

GIANT DIFFERENCE helps cut diesel maintenance costs!

Only D-X Diesel Motor Oils contain Extrinol. And Extrinol is the giant D-X difference that can make a giant difference in your diesel maintenance costs.

Extrinol helps D-X Diesel Motor Oils stand up longer. It increases their stability, their protective and lubricating qualities so they give you longer service. That means quite a saving in itself.

D-X Diesel Motor Oils — thanks to Extrinol — lengthen engine life. It's not unusual to hear of D-X lubricated engines traveling a quarter-million miles with only one overhaul. It's no surprise to learn that pistons, bearings and cylinder walls — when properly lubricated with D-X — show practically no wear even after years of 12 to 15 hours of service a day.

We're so certain D-X Diesel Motor Oils with Extrinol will cut your maintenance costs, we'll give you your money back if D-X doesn't satisfy you completely. If you live in the Midwest, contact your D-X salesman or write the office nearest you.

D-X

Diesel Motor Oils

MID-CONTINENT PETROLEUM CORPORATION

TULSA, OKLA.
Omaha, Nebr.

Waterloo, Ia.
Chicago, Ill.

Terre Haute, Ind.
Minneapolis, Minn.

Florida Diesel News

By Ed Dennis

AN OLIVER, 4 cyl. diesel with a Twin Disc clutch to replace a gasoline engine and provide power for the refrigerating unit on the *B.J.*, a shrimp freezer ship from Fort Myers Beach. A 20 kw. Hercules diesel generating unit was also installed in the engine room for other purposes.

FOR JAMAICA, British West Indies, a Buda diesel engine of 150 hp. with Fram fuel filters and Surret batteries via P.A.A. *Cargo Clipper*, to be used for marine purposes.

THE CENTRAL Georgia Railway ended its five year program of rehabilitation recently. During the rebuilding program they spent about \$22,500,000 on improvements and replaced all steam engines with new diesel locomotives.

RECENT WOLVERINE diesel installations included a model WM 1905 in the *Margaret-Marie*, 215 hp. with Snow Nabstedt 3:1 reduction gears. Other installations were in the *Christian J* and *Debbie-Jo-Ann*.

TWO MODEL 8-268-A Cleveland Diesel Div. GM engines, rated at 500 hp. each for the new man-haden fishing boat *Jose E. Carinhas*, Snow Nabstedt 2.5:1 reduction gears, a 6 hp. Lister and a 15 hp., 3000 watt Buda generating set are included in the engine room equipment.

A GENERAL Motors model 2-71 diesel engine with GM power take-off, Delco Remy starter and generator, radiator cooled; for irrigation purposes; from Equipment Sales and Service, Fort Pierce.

A LATHROP at 200 hp. for the new shrimp trawler *Vixen*, a package unit deal from Marine Motor Sales of Jacksonville. Also two 80 hp. Lathrops for the Bahama Islands freighter *ML 371*.

RECENT Caterpillar diesel tractor sales included a D 6 to James T. Woods; a D 7 to T. James Construction Co. and a D 8 for Troup Bros. Construction Co., all from Shelley Tractor and Equipment Co., Miami.

REPOWERED the *Hook-em* with two GM 4-71 diesels, Paragon hydraulic reverse and reduction gears, Purolator lube oil filters, Fulllo fuel filters, Delco Remy starters and generators; at the docks of Fla. Diesel Eng. Sales GM Corp., Miami.

THE *Inagua Trader*, a West Indies freighter, was repowered and converted from an ex-navy LCI at Dade Drydock, with two D 375 Caterpillar diesels and a 4 cyl. 20 kw. Hill diesel generating set for auxiliary purposes.

DIESEL BRIEFS: a 250 hp. Atlas with a Lister diesel on the *Florence B*; a 250 hp. Cummins on the *Frank M. Flowers*. The *William J. O'Brien* had a 575 hp. Fairbanks Morse installed along with a 120 hp. F.M. deck engine and a model JBS Cummins 150 hp. was installed in an International truck at Winter Garden.

Sound Engineering

by

BURGESS-MANNING COMPANY

... wherever the flow of AIR, STEAM, and other GASES create N-O-I-S-E.

Standard Snubber* designs are available, incorporating Air Cleaning, Spark Arresting, Water Separation, Waste Heat Recovery, and Surge Control Features.

You can depend upon Burgess-Manning Engineers for a quality product ... and SOUND ENGINEERING counsel to solve your noise problems.

Burgess-Manning Snubbers installed on The Budd Company RDC Diesel Rail Car.

*Typical Snubber





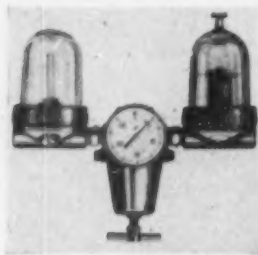
BURGESS-MANNING COMPANY

749-A East Park Avenue, LIBERTYVILLE, ILLINOIS

Chicago

Dallas

Filter-Regulator-Lubricator Unit



A new type of filter-regulator-lubricator unit which is said to contain numerous improvements over previous types is being produced by Arrow Tools, Inc., of Chicago. One of the outstanding features

of the Arrow filter is the porous bronze element which has the ability to retain on its outer surface a much greater amount of sediment without a serious loss of pressure. Air or filtrate enters the

unit where centrifugal action throws the moisture and heavier solids against the bowl and downward into a relatively quiet zone below the baffle where it is deposited. The air or filtrate then goes through the bronze element where even the finest particles are removed and only clean air or filtrate is allowed to pass through. The amount of deposit can be observed through the transparent bowl and removed through the drain cock at the bottom of the bowl. Element can be taken out and cleaned with a blast of air from the inside to dislodge sediment adhering to the outer surface.

The Arrow lubricator has been designed to deliver into the air stream a finely vaporized mist of oil that remains in suspension and provides positive

lubrication to the precision working parts of air operated equipment. A porous bronze feeder wick forces the lubricant to enter the air stream in a fine mist. The lubricator automatically varies the oil delivery according to the air flow requirements in most cases. However, if more or less oil is desired it may be obtained by varying the elevation of the bronze wick in the air stream. The wick setting is readily observed through the transparent bowl but is not subject to the danger of being tampered with by persons not familiar with its operation. Incorporated in the Arrow regulator are several new improvements in design: a new positive action self bleed feature for prevention of pressure build-up in dead end applications, etc., a diaphragm of new type oil resistant material with Nylon cord reinforcement, and stainless steel bushings and center shaft.

Here's How You Can Get LONGER LIFE FROM DIESEL ENGINES

and... ▶ Eliminate Seat Distortion and Blow-by or Hot Spots Which Cause Valve Port Cracks!

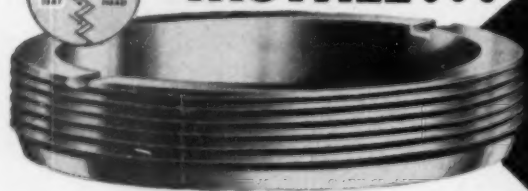
Heat expands seat with downward pressure locking together. Drawing below shows expansion clearance between threads.

▶ Increase Valve and Seat Life Up to 300%!

▶ Greatly Reduce Valve Burning, Breaking, Sticking! Seat Stays Round—Cools Valve.



INSTALL...



Peterson's
P-B Self-Locking
**SCREW-IN
VALVE SEAT**
with
EXPANSION CLEARANCE

NOW, FOR THE FIRST TIME...

A VALVE SEAT INSERT FOR ALL DIESEL ENGINES!

**No Radial
Pressure**

Distorted intake seats in some engines require excessive grinding to true up because exhaust expansion has pushed on one side—this problem is absolutely eliminated by P-B.

**Stress-Relieves
Valve Port Area**

Whether your diesel engine was designed for replaceable valve seat inserts or not—even though head or block is normally hot welded—you can get longer life from your engine and suffer less costly down-time by installing P-B Screw-in seat inserts... made of heat-treated Chromite material to retain its shape, wear longer.

**Locks-In
Can't Come Out**

Performance-tested in Diesels for over 15 years in Canada and the U.S., this new valve and seat maintenance program has proved its value in eliminating distortion around valve seats providing a perfectly round seat which allows valve to cool properly thus increasing valve mileage. 75% of the heat developed in valves is dissipated by transfer through valve seat to engine coolant.

**Precision
Installation**

Because the P-B seat is designed with expansion clearance and will not cock, buckle, or distort, valves seat perfectly on every stroke and will not bounce, flutter, burn, break or stick.

**Replace Without
Going to Oversize**

Whether your problem is head or block cracking around valve ports; valve burning and breaking; or costly, time consuming hot weld seat replacement—you can save money and trouble by installing P-B Screw-in Valve Seats with expansion clearance. Good pressure tested, laced up cold welds in valve port will not open up because P-B seat stress relieves the hottest point in the engine.

INSIST ON P-B ... Seats available for all Diesel engines including Sterling, Nordberg, Superior, LeRoy, Buda, Waukesha, GM Cleveland, Alto, Cummins and Cooper-Bessemer. Standard sizes in steps of 1/8" from 1 1/4" to 4 1/8" O.D. larger sizes on request.

Contact Your Master Shop — now located in every major city in the U.S. If your engine maintenance shop can't supply, write direct to:

PETERSON WELDING LABORATORIES, INC.

DEPT. DPS-9 • 1423 VIRGINIA • KANSAS CITY 6, MO.

LEADERS FOR 30 YEARS IN HEAD AND BLOCK VALVE PORT WELDING PROCEDURES.



Expanded Production Facilities



Bendix-Skinner expanded production facilities now permits making their well-known ribbon filter element available as a substitute for expensive metal edge or screen type elements

in a wide variety of installations. Made of phenolic-resin impregnated cellulose this filter requires no special backup support and is simple and inexpensive to install. Bendix-Skinner ribbon elements are permanent type filters, with high flow rate in either direction and are easily cleaned. Ribbon units are available in diameters from 1/2 in. to 6 in. in any required length with filtration rated at 40 microns (.0016 in.).

Drilling for Coal



When excessive overburden made further stripping operation uneconomical, and when rock conditions proved too dangerous for deep mining, the Ashland Coal Company, Ashland, W. Va., decided to drill a 30-inch vein of Pocahontas No. 11 in their McDowell County mine. With power provided by an International UD-6 diesel engine, McCarthy coal drills, 20 inches in diameter and five feet in length, tap the seam horizontally to a depth of 60 to 80 feet. Each tap is made in about an hour and produces approximately 1,300 pounds of coal to each length of auger. Operated by two men, the set-up has produced as much as 40 tons a day. The UD-6 also operates a Barber-Greene 24-in. wide, 30-ft. long conveyor, used to load two 8-ton trucks hauling the coal 2 1/2 miles to the company's tipple. Most of the output is shipped to steel mills within a 300-mile radius of the mine.

NOW

COMPLETE
HYDRAULIC
GOVERNOR
SERVICE

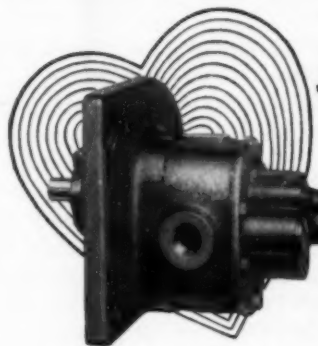
All makes and types of Hydraulic Governors serviced with Factory test equipment and tools according to Factory Methods and Specifications.



- Specialized Service on Woodward Governors including the new Mack-type Governor.
- All makes of Diesel Fuel Injection Equipment Serviced.
- For Fast, Efficient Service Telephone, Wire, Air Mail—

Universal Governor test stand developed by Woodward, specially for us. Seen here are two popular types of Governors, mounted for testing.

A&D DIESEL SERVICE, INC.
145 - 21st St., Brooklyn 32, N.Y. South B-3461 7637



Rotary geared pump with special flange mounting becomes integral part of diesel engine when installed. Note opening above relief valve for tachometer.

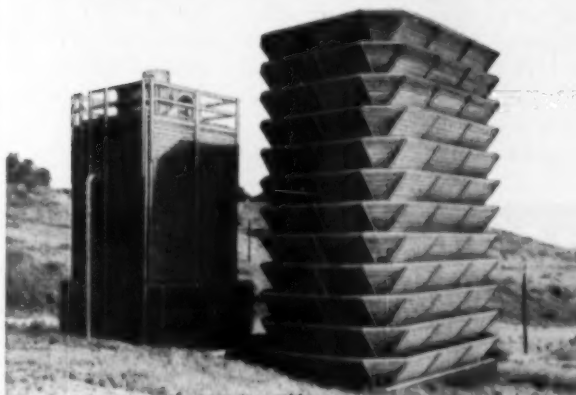
Modern diesel operation generally requires a pressure lubricating system — and the vital element is the pump. Thousands of Brown & Sharpe pumps are now providing reliable service month after month without interruption, for lubrication, transfer, or booster systems. Available with various types of flange mountings and special internal construction to meet specific requirements. Write for catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE B&S

The HEART of
a diesel
lubricating
system is
its PUMP

WHY DIESEL ENGINEERS DEPEND ON PRITCHARD



Here are two good reasons . . . these Pritchard Cooling Towers shown above. They provide maximum operating efficiency in the cooling systems of the modern diesel operation at the Central Electric and Gas Company in Chamberlain, South Dakota. The need for such efficiency is the reason this progressive company chose Pritchard.

Built by Pritchard — a founder member of the Cooling Tower Institute — means experienced, expert design and quality construction that provides long, dependable cooling service. Every Pritchard tower is thoroughly engineered and adequately sized for maximum efficiency, minimum maintenance . . . is unconditionally guaranteed to meet your most exacting performance requirements. That's why — both when you buy and over the years — your best value is Pritchard!

Pritchard QUINTAIR® Air-Cooled Heat Exchangers are accepted throughout the industry as the quality equipment for cooling diesel engine jacket water and lubricating oil. Practical Pritchard design simplifies maintenance, increases operating efficiency. Single units may be used for two or more simultaneous cooling jobs. Shipped completely fabricated . . . ready for fast, easy installation.

•Registered Trade Name



Industry's Partner for Progress

J.F. Pritchard & Co.

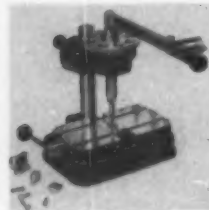
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COOLING TOWERS • SPECIALIZED HEAT EXCHANGERS • GAS & AIR
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Torque Testing Fixture



The P. A. Sturtevant Co., Addison, Illinois, announces a new torque testing fixture having a thousand practical uses. These are universal, simple and unique in design. A fully adjustable spindle set in instrument bearings is held in rigid alignment and permits rapid engagement of the driver with the work. The spindle has a female drive square to accommodate a wide selection of torque wrenches within the capacity of each of the two models. The driving end of the spindle is threaded so that users

may design drivers for special applications. A standard male drive square attachment is included with each fixture and is fitted to the driving end of the spindle. This permits using regular sockets, socket screw drivers, etc., without alteration. A T-slot base makes it convenient for a user to clamp nests and holder to the fixture.

Illustrated is a typical application of testing the ultimate strength of a screw. This test and others will permit both the establishment of standard torque values and the inspection of screws by consumers to determine if they comply with their own requirements or those standards established by universal acceptance. Internally threaded collets, collet holders and drivers for all screws are available for

use with these fixtures. There are two models of the Torque Testing Fixture now in production with capacities of 0 to 200 inch-pounds and 0 to 150 foot-pounds. Bulletin TTF giving complete specifications and suggestions for use is available on request.

Promoted

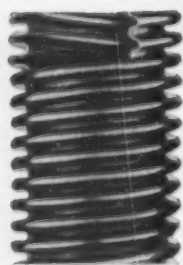
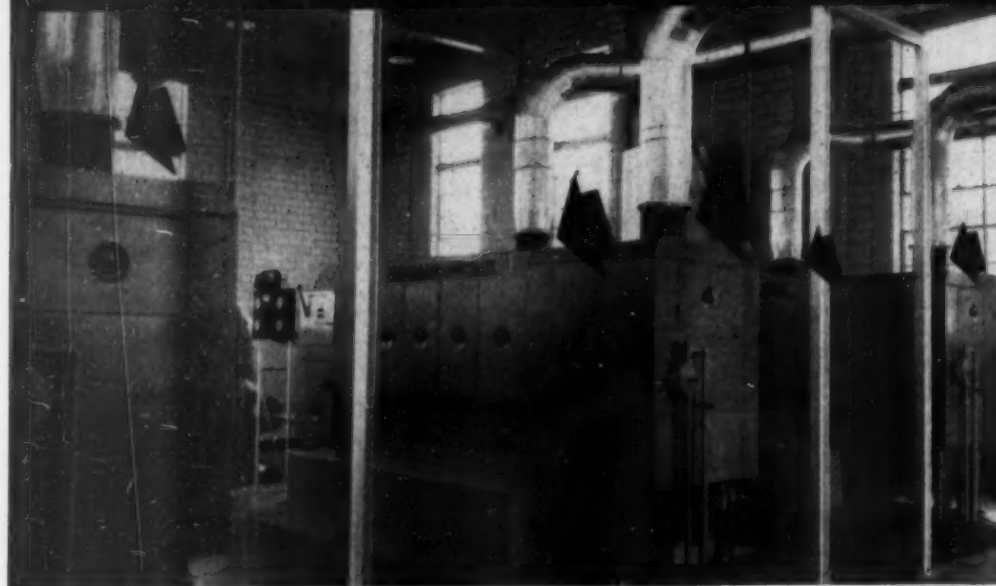


John Alcorn

The promotion of John Alcorn to Cooper-Bessemer's foreign sales office has been announced by Stanley E. Johnson, vice president in charge of sales for The Cooper-Bessemer Corporation, Mount Vernon, Ohio. In his new capacity, Mr. Alcorn will be assistant to Mr. M. Pollock,

president of Cooper-Bessemer Overseas, Cooper-Bessemer International and Cooper-Bessemer of Canada, Ltd., with offices in New York City. A graduate of the University of Michigan, Mr. Alcorn was formerly associated with the Ford Motor Company and the Chrysler Corporation before coming to Cooper-Bessemer. During recent years at Cooper-Bessemer, he has been responsible for the application engineering of gas engine-driven and motor-driven compressors. In his new capacity as assistant to the president of the Cooper-Bessemer export companies, Mr. Alcorn will devote his efforts to the sale of engine and compressor equipment outside of the United States.

Protect Rigid Piping and Exhaust Manifolds with CMH Diesel Exhaust Connectors



Section of CMH Diesel Exhaust Connector of the type used on the diesels shown above. Available with metal braid if desired.

The CMH Exhaust Connector is a corrugated steel tube designed to dampen exhaust line vibration. By absorbing this ever present motion, the exhaust connector protects and greatly lengthens the service life of rigid exhaust piping and helps prevent fatigue cracking of engine parts. Its protective action prolongs diesel life, reduces maintenance and assures cleaner engine room air.

The CMH Exhaust Connector is low in first cost and easy to install. It can be screwed, welded or flanged into any diesel exhaust line. Sizes range from 1" to 24" I. D. inclusive. For complete information, write for catalog 124.

OTHER DIESEL APPLICATIONS FOR FLEXIBLE METAL HOSE

Use CMH Flexible Metal Hose to eliminate the stresses of vibration, expansion and contraction and misalignment in water lines, air lines or any application where rigid piping must be connected to the engine. It is offered in steel, bronze or stainless steel in corrugated or convoluted types.

CHICAGO METAL HOSE Division

Flexonics Corporation

1725 S. Third Avenue • Maywood, Illinois

Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems • Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Pleasen identifies CMH products that have served industry for over 50 years.



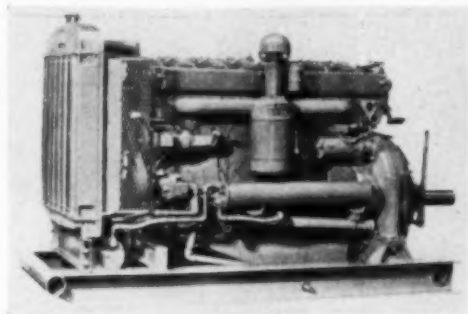
Diesel Oilfield Power Units

A new catalog covering the entire line of General Motors diesel engines for drilling and other oilfield uses has been published by the Detroit Diesel Engine Division. Included is complete information on the recently-introduced Twin "6-110" diesel with newly-designed GM torque converters and other Detroit Diesel units which can be compounded to meet oilfield requirements up to 2000 horsepower. The book is well illustrated with views of the various models, application photographs, performance curves and contains detailed specifications. It may be obtained from Detroit Diesel oilfield engine distributors or by writing Detroit Diesel Engine Division, General Motors Corporation, 13400 W. Outer Drive, Detroit 28, Michigan.

To Construct New Plant

Plans for construction of a new plant, at a location not yet determined, were announced recently by Louis B. Neumiller, president of Caterpillar Tractor Co. The new plant, occupying 700,000 square feet of floor space, will be devoted to the production of the Company's line of motor graders and industrial wheel tractors. This move is being made to accommodate at Peoria a broadened program of crawler tractor and diesel engine manufacture. This enlargement and rearrangement of manufacturing facilities and construction of the new plant are expected to be completed by the end of 1955. The total cost of new machinery and equipment at all plants, and of land and buildings at the new plant is estimated to be approximately \$45,000,000.

Murphy Extends Line



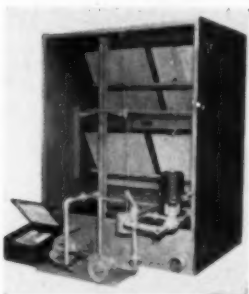
The power range of Murphy diesel engines has been extended upward with the addition of four new models having a bore of 6¾ in. and a stroke of 6½ in. The new Model 24 is rated at 185 hp. continuous, 200 hp., intermittent; the Model 124 at 210 hp., continuous, 225 hp., intermittent; the Model 224 at 200 hp., continuous, 215 hp., intermittent; the Model 324 at 225 hp., continuous, 240 hp., intermittent. Models 24 and 124 are designed to operate at 1200 rpm., continuously; Models 224 and 324 at 1400 rpm., continuously. The addition of these four models brings to 25 the number offered by Murphy diesel. They range in output from 90 to 240 hp.

Offers Two New Catalogs

Two new catalogs featuring Tuthill small industrial pumps and general purpose pumps are now available to pump users according to H. T. Kessler, president of Tuthill Pump Company, Chicago. Catalog No. 101 covers the complete line of Tuthill Model L Series of small industrial pumps designed for lubricating, hydraulic, transfer, circulating and burning oils service. Catalog No. 102 presents the Model C Series of general purpose pumps for use with non-corrosive liquids with lubricating qualities.

A feature of these catalogs is the unique pump guide at the front which presents the services, operating data, and the distinguishing features for each model so that users can quickly determine the specific pump suited to their applications, it is stated. Dimensions and parts diagrams, performance curves, mounting styles and modifications of pump design are included in each of the catalogs. Copies of either Catalog 101 or 102 can be obtained direct from Tuthill Pump Company, 939 East 95th Street, Chicago 19, Illinois.

Improves Self-Washing Filter



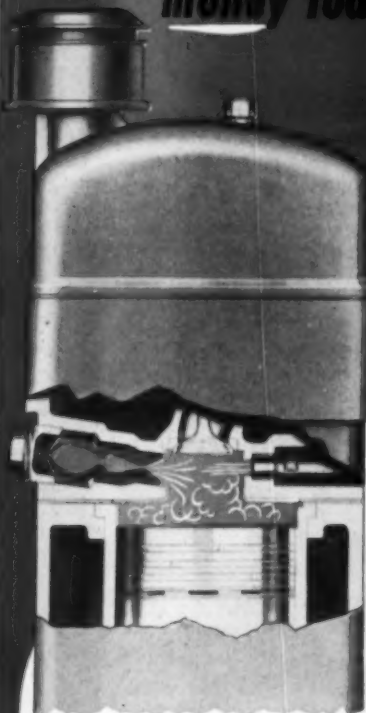
Two important improvements, the addition of test buttons which enables operation of the washing and re-oiling mechanism without disturbing the automatic cleaning cycle, and the introduction of a unit to drain all water lines automatically as a protection against freezing, are new features incorporated in the Far-Air self-washing filter, according to J. D. McCamp-

bell, sales manager for the Farr Company of Los Angeles, manufacturers of Far-Air filters and air filtration equipment. The new drain unit is spring actuated, positive in action and requires an operating pressure of only 20-25 pounds. The test buttons have been installed so that the cleaning and oiling mechanisms can be tested and operated at will without disturbing the automatic timing cycle.

Far-Air self-washing filters are equipped with corrosion-resistant 20" x 20" x 4" units installed at a 30-degree angle toward the air flow. A series of automatically controlled water and oil jets on the entering air side periodically wash and re-oil the filter units to maintain maximum filtering efficiency. Safety measures include a "deluge" valve

which minimizes the possibility of fire passing through the unit. A cable incorporating a fusible link holds the valve closed. This fusible link parts at a temperature of 160°F and releases a weighted handle, opening the valve and resulting in continuous streams of water being directed to the filter units. The Far-Air self-washing filter employs no oil sump to create a possible fire hazard and all excess oil is immediately flushed directly down the drain. These filters are available in capacities to handle any CFM requirement. They are shipped complete with all parts ready for operation. The sturdy, lightweight construction makes installation simple. Information may be obtained by writing Farr Company, P. O. Box 10187 Airport Station, Los Angeles 45, California.

It's the "Combustion-Wise"
Diesel Buyer who saves
money today!



Cutaway view showing a typical Lanova combustion system design. The Lanova design is used in many leading makes of diesels today. We'll be glad to send you the list.

When buying a diesel...size, weight, capacity and initial cost are important factors to consider.

But the really smart diesel buyer, with an eye on his profit statement, also considers *operating costs*. That's why more and more diesel buyers are becoming "combustion-wise" and specifying diesels that use the Lanova combustion chamber design. They know that the higher combustion efficiencies of the Lanova System mean "more miles per gallon" and better fuel economy.

The Lanova combustion system boosts operating efficiency two ways. First, it provides a high degree of turbulence in the main combustion chamber, which insures more thorough mixing of fuel with the air needed to support combustion. Second, it controls and times the application of pressures to the piston thus providing a longer, more effective thrust during the power stroke.

Write for the Lanova Handbook

This valuable basic textbook on diesel engineering tells the whole combustion story — write for your free copy.



Lanova

LANOVA CORPORATION
38-17 30th Street, Long Island City 1, N. Y.

One of America's foremost names in diesel research and development

**94.9% of Lockheed's 50,000
employees are enrolled
in the Payroll Savings Plan**



ROBERT E. GROSS

President, Lockheed Aircraft Corporation
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Industry Payroll Savings Drive

"A man's personal economic security is the sum of his own diligent effort, a financially sound government and a systematic savings plan. He has the earnings and he has the government that can protect the individual. However, human nature being what it is, not everyone maintains a systematic plan of savings. So here is a plan designed to help the employee—the Payroll Savings Plan, whereby his company will regularly invest a part of his earnings (he specifies the amount) in United States Savings Bonds, America's safest form of investment. We at Lockheed have endorsed and encouraged this plan because we know what it does to assure security—both individual and national."

Lockheed Aircraft Corporation recently conducted a person-to-person canvass that put a Payroll Savings Application Blank in the hands of every employee of Lockheed's eleven plants in Southern California. At the conclusion of this one-week campaign, 36,419 of the 38,037 employees—95.7%—had signed up on the Payroll Savings Plan. Three of the eleven plants achieved 100% enrollment.

Lockheed's 95.7% in the Southern California plants is the highest employee participation of any company or group of this size this year. The previous national record in the aviation industry—92%—was set by Lockheed's Georgia Division in April, 1953. Of Lockheed's total payroll—50,000 men and women—94.9% are building "... security—both individual and national" by systematic investment in U.S. Savings Bonds.

45,000 companies operate Payroll Savings Plans. In many of these companies employee participation ranges from 60% to 80%; in some, it is even higher. On the basis of Payroll

Savings Records, it is safe to estimate that 60% or more of the personnel of a company will join the Payroll Savings Plan—

- if the many personal benefits of the Payroll Savings Plan are properly presented to them by management.
- if they are shown how their monthly investment in Savings Bonds contributes to national stability by adding to our reservoir of future purchasing power—\$35.5 billion—the cash value of outstanding Series E Bonds—the kind purchased by Payroll Savers.

Your State Director, U.S. Treasury Department, is ready to help you build a 60%, 70% or 80% Payroll Savings Plan. He'll explain how easy it is to conduct a simple person-to-person canvass and will furnish all the printed matter, posters, etc. Phone, wire or write today to Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Building, Washington, D. C.

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Rx H. T. Tamm

Editor—DIESEL PROGRESS



Mid-West Editor of DIESEL PROGRESS



Bruce Wadman

Graduating from Stanford University last June Bruce Wadman took over August 17th as the Mid-west editor for DIESEL PROGRESS, operating out of our new Chicago office, 612 N. Michigan Ave., Chicago 11, telephone WHitchall 3-0919. He will cover the states of Michigan, Illinois, Indiana, Kentucky, Missouri, Iowa, Minnesota and Wisconsin. He has been working, in his spare time, as San

Francisco editor for the past two years and many of our readers have noticed his column "Bay Area News" plus some regular articles which he has contributed from time to time. As may be surmised he is the son of Rex W. Wadman, Editor and Publisher of this magazine.

Diesel Engine Operators' Institute

A diesel engine operators' meeting will be held at the University of Wisconsin, September 30, October 1 and 2. This institute is designed especially for men interested in the efficient and economical operation of diesel engines and should be of value to diesel electric plant operators, contractors with diesel equipment, county highway department shop superintendents and truck and bus maintenance supervisors. The enrollment fee is \$20 for the course. Checks should be mailed to George R. Sell, Institute Coordinator, Diesel Engine Operators' Institute, University of Wisconsin, Madison, Wis.

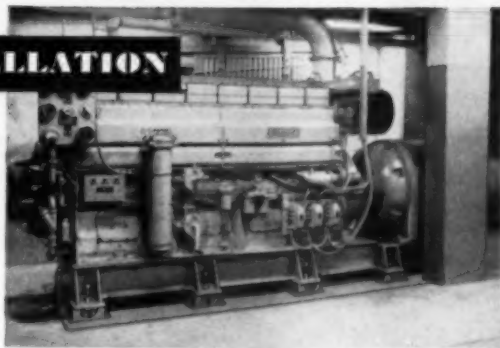
Oil and Gas Power Division of ASME

Accessory manufacturers who are planning on exhibiting at the 1954 Annual Meeting of the Oil and Gas Power Division of ASME are being asked to make their reservations early. Space at the Milwaukee convention which was held in May this year was sold out early. The 1954 meeting is scheduled to be held at the Muehlback Hotel in Kansas City, June 14th to 17th.

STOP VIBRATION WITH KORFUND VIBRATION CONTROL

A CIVIL DEFENSE INSTALLATION

Korfund Vibration Control helps protect vital telephone service! This Sterling 8 cyl., 535 HP engine is on standby service for the Pacific Telephone and Telegraph Co., in California and is capable of delivering 400 KW to assure continuous telephone service in the event of power failure due to enemy action or other causes. Korfund Vibration Control assures vibration-free operation of the engine thereby protecting the delicate relays in electronic telephone switching operations, and preventing vibration and noise transmission to other parts of the building.



*Install
Engines
Anywhere*

Whether they are intended for standby Civilian Defense and other emergency use, or for day-to-day regular service, you CAN install engines anywhere with positive freedom from objectionable vibration by using Korfund Vibration Control Units.

Korfund Vibration Control permits engine installation even in hospitals, office and apartment buildings, on truck trailers, railroad cars, or ships. Efficient and economical Korfund Units stop vibration, and reduce engine and building maintenance costs; reduce noise level; and frequently eliminate the need for special foundations.



THE KORFUND CO., INC.

48-20B Thirty Second Place, Long Island City 1, N. Y.
In Canada: 310 Canal Bank, Ville St. Pierre, Montreal

For more information, see our page in the "Diesel Engine Catalog", or our catalog in Sweet's Files — or write for your copy of our Bulletin No. 11.

SEPTEMBER 1953

HILCO

LUBE and FUEL OIL PURIFICATION . .

**GET RID OF DIRTY OIL . . .
GET LOWER OPERATING COSTS,
LONGER EQUIPMENT LIFE**

HILCO oil purification means complete oil purification! With a HILCO you get removal of sludge, acids, carbon, water and fuel dilution economically and efficiently. HILCO operation is continuous, all-electric and automatic.

Clean oil at all times reduces down time, increases production and HILCO units pay for themselves in savings.

HILCO offers a wide range of oil purification units . . . one to meet your needs. Write us about your equipment . . . and get recommendations at no obligation.

**THERE'S A HILCO FOR EVERY LUBRICATION
AND FUEL OIL FILTERING
PROBLEM . .**



HILCO has 25 years experience in oil purification. Let this experience work for you.

Oil Reclaimer

PURIFIERS

FILTERS

RECLAIMERS

CONDITIONERS

A complete range of sizes and systems for oil purification.

• WRITE FOR
FREE LITERATURE . . . NO
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81

Locomotive Maintenance Officers' Meeting

The annual meeting of the Locomotive Maintenance Officers' Association which will be held at the Hotel Sherman in Chicago, Illinois September 14 through 16, will feature a number of discussions the subjects of which are of vital importance to railroad maintenance. The exchange of ideas at these annual meetings and the discussion of maintenance problems have resulted in manifold economies.

The Monday, September 14th schedule includes a talk by D. S. Neuhart of the Union Pacific on "Gas Turbine Locomotive Maintenance and Opera-

tion"; E. L. Duggan of the A. T. & S. F., speaking on "Spot-Lighting The Accident Prevention Program"; E. V. Myers of the St. Louis-Southwestern Ry., discussing "Methods Used to Train Personnel For Maintaining Locomotive"; and W. P. Miller of the Chicago & Northwestern on "Flashovers—Rewiring Diesel Locomotives."

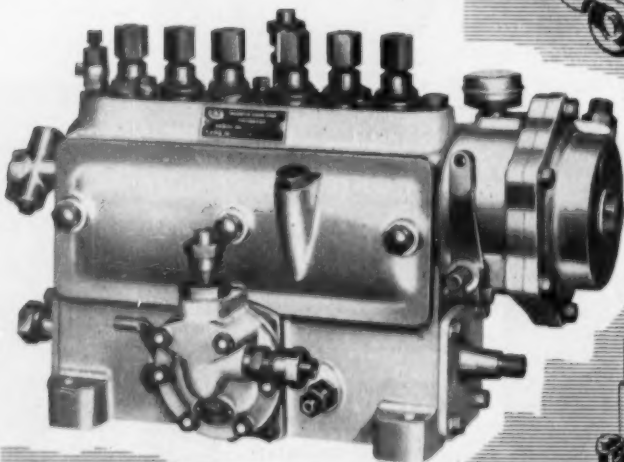
Tuesday, September 15th will be opened by C. H. Spence of the Baltimore & Ohio reporting on "Inspection and Maintenance of Diesel Wheels, Axles and Roller Bearings"; the special address at 10:30 a.m. will be given by A. C. Melanson of the Canadian National Railways; and the principal speaker at the special luncheon honoring all railroad presidents will be P. E. Feucht, president of the Chi-

cago and Northwestern System. A special review of diesel locomotive maintenance industries will be held at 3:00 p.m. This specially arranged and conducted tours for locomotive maintenance officers only.

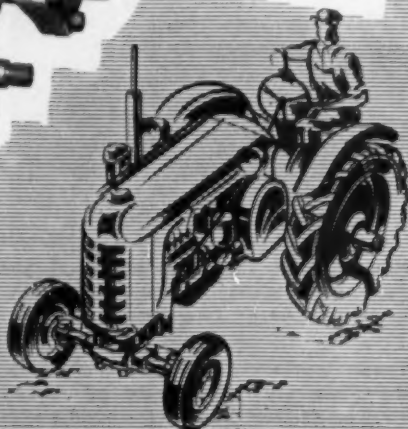
The morning of Wednesday, September 16th features two reports. At 9:00 a.m., E. L. Neeley of the Union Pacific will speak on "Scheduling and Flow of Work in Centralized Diesel Shop." At 10:30, J. W. Luke of the A. T. & S. F. will report on "Diesel Engine Maintenance Problems." Allyn C. Breed, acting director of the Bureau of Locomotive Inspection, I.C.C., Washington, D. C., will present a special address at 2:00 p.m. The closing report at 3:00 p.m. will be made by H. J. Anderson of the New York Central System on "Economical Reclamation of Diesel Locomotive Parts."



**The world's largest
manufacturers of
FUEL INJECTION
EQUIPMENT
for diesel engines**



**DEPOTS AND
SERVICE AGENTS
IN OVER
100 COUNTRIES**



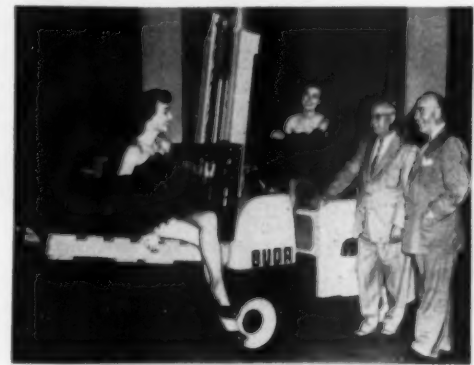
C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC., 653, TENTH AVENUE, NEW YORK, 19, N.Y.
Sales Office: 14820 DETROIT AVENUE, CLEVELAND, 7, OHIO.



Fuel Injection and Electrical Equipment



Lift Trucks Get Spotlight in "Magic" Show




R. K. Mangan (right), president of The Buda Company, Harvey, Ill., and Lee Daniels, vice-president, meet star performers of the "Buda Magic" show presented by the firm in Chicago. The "cast" included new FT diesel and gas powered fork lift trucks like the one shown and other Buda equipment plus two of the "world's most beautiful lift truck operators," Dorothy Duncan (left) and Bonnie Payne.

More than 300 business and industry executives along with representatives of the press saw The Buda Company, Harvey, Ill., open the nationwide tour of its "Buda Magic" show in Chicago July 15 with a theatrical demonstration which combined glamor and entertainment in a dramatic showing of the new features of Buda's FT fork lift trucks. In devoting the major share of the program to the FT models, Buda put the spotlight on such features as stripdown in 22 seconds, complete disassembly in 22 minutes and an actual clutch change in 30 minutes. It utilized the talents of the "world's most beautiful lift truck operators" and magician Ravel in running the FT trucks through a variety of tests and feats of skill to emphasize the greater maneuverability, easier operation and faster servicing they provide.

Co-sponsor with Buda of the Chicago premiere was Lift Truck Service Company, the distributor in that city. The show gave this company an opportunity to display other Buda handling equipment, Buda's industrial engines, and service facilities which are among the largest and best equipped in the nation. R. K. Mangan, president of Buda, Lee C. Daniels, vice president and manager of the materials handling division, and Chet Carner, president of Lift Truck Service, were hosts after each of the three performances at buffet parties for the audiences. Buda distributors in all principal cities will see the "Buda Magic" show on tour.

Helicopter for Spotting Tuna



Another first for a
UNION Diesel powered Tuna Clipper

The UNION DIESEL ENGINE Company
 2200 EAST SEVENTH STREET
 OAKLAND 6, CALIFORNIA, U.S.A.
 Cable Address—“UNIGAS”

PIERCE
CENTRIFUGAL governors
 give you exact R.P.M. control
 . . . at
LOWER COST



For more than 40 years Pierce has specialized in the speed control field. Pierce Centrifugal Governors, engineered specifically for your Diesels, give accurate, dependable control of engine RPM to meet the varying conditions of any job. Pierce Governors are standard equipment on many of America's finest diesel engines . . . assuring maximum protection, dependable performance—at lower initial and maintenance cost. Replacement governors and parts are available through your local distributor or fuel injection service station.

For distributor's name or information on special governing problems, write

PIERCE
 the **PIERCE GOVERNOR CO., Inc.**
 1612 Ohio Avenue, Anderson, Indiana

“WORLD'S MOST EXPERIENCED GOVERNOR MANUFACTURER”

IF YOU ARE PAYING FOR FRILLS INSTEAD OF FILTRATION

Specify
Bendix-Skinner
 RIBBON FILTER ELEMENTS . . .

- LOWER ORIGINAL COST
- SIMPLE, INEXPENSIVE TO INSTALL
- NO EXPENSIVE BACK UP SUPPORT REQUIRED
- PERMANENT TYPE
- HIGH FLOW RATE (EITHER DIRECTION)
- EASILY CLEANED

It seems hard to believe, but you can actually have more efficient filtration at considerably lower cost if you simply use Bendix-Skinner ribbon elements instead of expensive and less adaptable metal edge or metal screen types.

Here's how it works—Bendix-Skinner ribbon elements are inexpensive to begin with and can be installed at far less cost than metallic elements that require special back-up supports. In fact, in practically every instance present metallic-type elements can be changed over to ribbon-type with substantial savings.

Ribbon units are available in diameters from $\frac{1}{2}$ " to 6" in any required length with filtration rated at 40 microns (.0016").

Our engineering department will be glad to advise on new installations or to furnish replacement units in a variety of sizes. Write us for details.



PHENOLIC-RESIN IMPREGNATED CELLULOSE

Bendix-Skinner
 ORIGINATOR OF MICRONIC FILTRATION
 SKINNER PURIFIERS DIVISION OF **Bendix**
 1303 TROMBLY AVENUE, DETROIT 11, MICHIGAN
 Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N. Y.



Performance Proven in millions of installations.

Admiral Leggett Heads Bu-Ships



Rear Admiral W. D. Leggett, Jr.

One of the brightest pieces of news to come out of Washington in a long, long time is the announcement of the promotion of Rear Admiral W. D. Leggett, Jr. to head the Bureau of Ships. The hearty congratulations of the editor and of the entire Diesel Industry goes out to him as he takes over his heavy responsibilities.

Legs Leggett, as he is known to many of us within the industry, has been working with us, as an industry, for many years in correctly applying diesel engines to the requirements of the Navy. His knowledge of diesel engines and their application to ships is profound. His selection to head Bu-Ships is indeed a happy one—he knows ships, he knows engines and knows what the Navy needs. A good man well placed in this emergency.

Plans School for 70-95 Ton Locomotives

A school for 70 and 95 ton diesel-electric locomotives will be conducted by the Locomotive and Car Equipment Department of the General Electric Company in Erie, Pa., from Oct. 5 through 9. Instruction will be concentrated in three areas: (1) Principles of operation; (2) fundamentals of equipment and trouble shooting, and (3) better maintenance practices. Factory and classroom demonstrations will supplement the classroom work to provide a better understanding of the principles that are presented, according to O. W. Hazelton, school director. Two days of the week will be spent at the Cooper-Bessemer Corp. in Grove City, Pa., where the class will receive instruction on the diesel engine. Some 20 students representing the steel and chemical industries, small railroads and mines are expected to attend the session, Mr. Hazelton said.

Euclid Becomes GM Division

Harlow H. Curtice, president of General Motors, announced last month that the Board of Directors of General Motors has authorized an exchange of common stock of General Motors for all the outstanding preferred and Class A stock of the Euclid Road Machinery Co. The basis of the exchange is one-half share of General Motors common stock for each share of Euclid preferred stock and 7.9 shares of General Motors common stock for each share of Euclid class A stock. This will require the issuance of 305,137 shares of General Motors common stock in exchange for 16,510 shares of preferred stock and 37,580 shares of class A stock of Euclid Road Machinery Co.

Acceptance of the offer by Euclid shareholders would result in the extension of General Motors truck lines into the heavier off-the-road types of vehicles not produced by General Motors and as now represented by Euclid products. Such a program of product extension has been under consideration by General Motors for some time. General Motors now supplies diesel engines and torque-converter transmissions for this type of vehicle. The Euclid company's administrative offices and manufacturing activities are located at Cleveland, Ohio. It also has a wholly-owned manufacturing subsidiary near Glasgow, Scotland. Euclid's products are rubber-tired rear and bottom dump trucks ranging in size from 10 to 50 tons. It also produces scraper carriers ranging in size up to 30 tons. It has been a pioneer in this field.

Motor Boat Show

The National Motor Boat Show being planned for January 15 through 23, 1954 will be a Golden Jubilee event. Appropriately, it will be housed in the colossal Kingsbridge Armory located in the Borough of the Bronx in New York City. This structure has the world's largest unobstructed floor area, 180,000 square feet. As a consequence, all exhibitors will have first floor space.

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M. V. "INTERNATIONAL"



THE excursion boat *International* which is operated by the Glacier Park Company on Waterton Lake, is a vessel 72 ft. long, 16 ft. beam, which, since she operates on international waters (half in the State of Montana and half in the Province of Alberta) is licensed by U. S. Coast Guard to carry 250 passengers. The *International* was built in 1928 as a twin screw vessel with two 120 hp. gasoline engines, turning propellers at 1200 rpm., giving the boat a top speed of a little over 10 miles an hour, burning on an average, 15 gallons of gasoline per round trip, and due to the small capacity of tanks, requiring refueling every other day.

When it was decided last winter to provide new engines for the *International*, Carl J. Nordstrom, Seattle naval architect, was selected to prepare plans and specifications covering the new installation. He selected a pair of 83 bhp. 471 General Motors diesel engines, with 2 to 1 reduction gears to be installed with considerably heavier shafting than that of the first installation, and much larger propellers proportioned to use the power at a considerably lower shaft rpm. Along with the engine installation went a complete set of new fuel tanks of larger capacity and complete Sperry Hydraulic pilot house control for the engines. The propellers and shafting were furnished by Coolidge Propeller Company, Seattle. A contract for the work was given to Duwamish Shipyard, Seattle, early in April of this year, and they proceeded to prefabricate as much material as possible directly from plans and shipped it to Glacier Park. Complete new engine foundations were installed and everything gotten ready to install the engines, after which the boat was set afloat and towed to the north end of the lake where the engines were delivered and placed on board. The "engine room" is very compact, but due to the construction of the vessel the two engines project above the cabin floor. A special hatch was cut and an aluminum housing made to fit over the machinery. This is fitted with doors and hinged covers so that the engines are completely accessible for servicing but completely out of sight otherwise. Heavy insulation on the inside of the engine covers cuts out 80% of the noise of the machinery, the sound of which is hardly noticeable anywhere on deck or inside. The old gas engines had their exhaust pipes out of the stern, the new installation carries the exhaust of both engines up through a stack on the boat deck, leaving the boat entirely

free of exhaust fumes regardless of the direction of the wind.

When the job was finished, and the boat given a trial trip, the results were startling beyond expectations. As a result of having bigger propellers turning at a slower speed, the *International* now runs about 14 miles an hour. Nearly half again as fast as before. She takes only 6 gallons of diesel oil per round trip and by her increased speed can make more round trips a day than she could before. She is absolutely quiet, free of vibration, and steers more steadily. She doesn't have to touch the fuel dock oftener than once every 10 days or so and her fuel bill is only about 25% of what it was when she burned gasoline. The result: greater potential revenue from ability to make more trips and a handsomely lowered operating cost and this with less shaft hp. since she now has only 166 installed bhp. as against 240 in the obsolete plant which was removed. On top of all this is a remarkable gain in safety since the explosion and fire hazard incidental to the use of gasoline has been eliminated.

Waterton Lake is a body of fresh water in the heart of the most spectacular part of the Rocky Mountains. It is nearly 8 miles long, about a mile above sea level and its shores show some of the grandest scenery on the American Continent. The excursion trip on the *International* is one of the highlights of every tourist's visit to the park, and during the short season from June 15th to September 15th, thousands of people are carried on this picturesque body of water by the staunch little ship.



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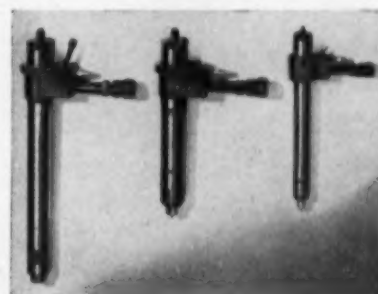
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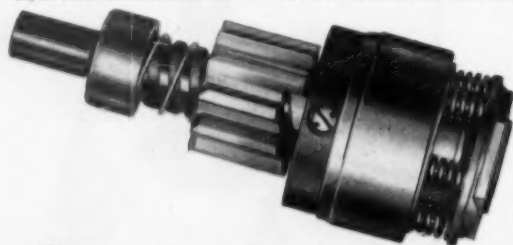
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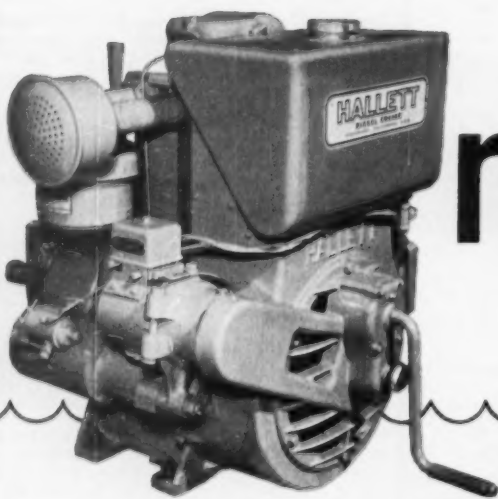


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New Sales Headquarters



W. Ray Kern



W. B. Walker



Robert A. Pelusi

Establishment of new sales headquarters in Murray, Ky., and the transfer of key personnel from Oakland, Calif., to the southern city have been announced by Winslow Engineering Company, manufacturers of Winslow filters and elements. Heading the group of men who moved east

from the Pacific Coast on August 10 was W. Ray Kern, the firm's general sales manager. He was accompanied by his assistant, W. B. "Bill" Walker, and division sales representative Robert A. Pelusi. They will be joined in the near future by a second division sales representative who has not yet been appointed. Announcement of the shift was made by W. G. Nostrand, Winslow's vice president in charge of sales and engineering, who will continue to direct the company's marketing activities from the offices in Oakland. Also remaining at the California plant are western division sales representative John Bacher and a staff of assistants.

The creation of dual sales facilities, according to Mr. Nostrand, was brought about by Winslow's desire to make service as well as products more readily available to the company's distributors and customers in all parts of the United States and Canada. After more than 25 years of concentrating all its manufacturing in Oakland, Winslow opened a new factory in the Kentucky city early in 1952 and is now supplementing those facilities with a complete sales organization. Mr. Kern, in addition to his sales post, has also been appointed manager of the entire Murray plant. In the latter capacity, he reports daily to L. L. Moore, vice president in charge of manufacturing, who makes his headquarters in Oakland.

"Heat Transfer News"

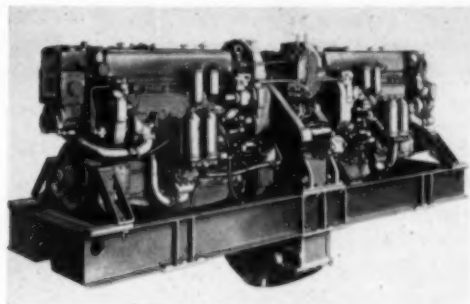
"Young Heat Transfer News," is the title of a new two color external house organ published by the Young Radiator Company, Racine, Wisconsin and Mattoon, Illinois. "The purpose of this publication," states president and general manager, F. M. Young, "is to disseminate engineering information on existing and new installations." Subjects of installations include pictorial and editorial presentation of Aeronautical, Automotive, Oil Field, Heavy Industrial, Municipal and Chemical Process Cooling Equipment. "Young Heat Transfer News," published bi-monthly, is offered free of charge to all interested companies and organizations. Write: Editor, Heat Transfer News, Young Radiator Company, 709 S. Marquette St., Racine, Wisconsin.

Introduces New Drives

To introduce five new friction and hydraulic drives for powered equipment used in the major industries, Twin Disc Clutch Company of Racine, Wisconsin and Rockford, Illinois, has released a special 16-page "New Products" issue of "Production Road," its house magazine. The new Twin Disc drives and the purpose of their development include a two-stage hydraulic torque converter, to fill the gap in industrial hydraulic drives; a new 2-speed transmission, to obtain extended full-range performance from three-stage torque converters; a new disconnecting hydraulic power take-off, to provide a higher capacity, more compact disconnecting fluid drive for powered equipment; a new air-actuated clutch, offering lighter weight and more narrow clutch width with higher torque capacity; and a new oil-actuated multiple plate clutch, incorporating an integral cylinder to eliminate adjustment and provide constant torque capacity, more compactness, longer wear life, and adaptability to remote control.

"As has been the privilege of Twin Disc since World War I, each of these new drives was developed in close cooperation with designers, manufacturers and users of industrial machinery," stated John H. Batten, Twin Disc president. "Throughout more than 35 years, as new equipment—both driving and driven—has been developed to achieve faster work cycles and greater capacities, Twin Disc has met the challenge by setting the pace with better power linkage." Copies of the "New Products" issue of "Production Road" may be obtained by writing Twin Disc Clutch Company, Racine, Wisconsin, or Hydraulic Division, Rockford, Illinois.

Heavy Duty Marine Engine Announced



A new heavy duty marine diesel engine was announced last month by the Detroit Diesel Engine Division of General Motors. It is a multiple engine unit with two of the Division's model "6-110" engines tandem-mounted on a single base to drive a single propeller shaft. Like other Detroit Diesel power plants, the new engine is a comparatively compact and light-weight unit, but it puts a rugged 409 shaft horsepower aboard a work boat or a smooth 530 shp. aboard a pleasure boat. The work boat rating is a continuous, around-the-clock rating developed at 1600 rpm. The pleasure boat rating is an intermittent rating developed at 1800 rpm.

The tandem arrangement of the engine, with all servicing points easily accessible, provides a unit that is easy to work on even in an engine room of

minimum size. In fishing or cargo boats the size and weight of the engine extracts comparatively little from payload space. It lends itself nicely to the low, sleek lines currently in vogue in pleasure craft. Its width is 48½ inches with bulkhead mounted air cleaners and 61½ with engine mounted air cleaners. It measures 145 inches in length and weighs 11,000 pounds or 20 pounds per horsepower based on its maximum rating. Its height is 68½ inches. Greater maneuverability, especially important in work boats, is assured by quick engine response to a single lever which controls both gear and throttle. From the neutral position the lever is moved forward to engage the forward gear and also to move the boat ahead through all throttle positions. Moving the lever to the rear

engages the reverse gear and also advances the throttle to the desired position.

The gear box is unusually rugged in construction and is equipped with straight and tapered roller bearings throughout. This increases load and thrust capacity and permits self-centering of the pinion gear. Reduction gears are of the double helical type with exceptionally wide faces which contribute to quiet operation and longer life. The engine is available with either port or starboard engine rotation, has General Motors hydraulic reversing, reduction gears up to 6 to 1 and push button electric starting. With single screw propulsion one engine operating alone will move a boat at 80% of its normal speed.

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Harbormaster Model O-41H, 50 h.p., gas power shown at left. (Model O-42, 40 h.p. diesel is similar in appearance.)

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Hundreds of Harbormasters are now in continuous, heavy duty marine work. Shown below is pusher type boat with 3 Harbormaster Outboard Units used for pushing 200-ton barge loads 25 miles up a shallow river . . . requires only 3 foot draft!



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Can readily be installed on most barges, scows, towboats, tugs, derricks, lighters, etc. Is completely assembled and lined up in our plant.
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You get the ultimate in maneuverability with the exclusive patented M&T 360° Propeller Thrust Steering Control.
- **Underwater parts easily accessible for maintenance or repair**
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- **Opens new shallow water fields to continuous operation**
Hulls with Outboard Propulsion can be designed for operation in shallow water where inboard powered hulls are impractical. Patented shear pin automatically shears off should underwater assembly strike submerged obstacle. Assembly rides over obstacle, free from damage, without loss of forward motion and operating power! New pin easily replaced while you are under way.
- **Economical to operate**
You realize big savings in fuel expense because you get more thrust per horsepower with outboard propulsion.

Specifications:

Sizes available from 20 to 300 h.p., gas or diesel power.

Model O-41H (illustrated)

Engine H.P.	50
Engine R.P.M.	2300
Propeller diameter	30"
Propeller pitch	15"
Propeller R.P.M.	608
Fuel tank	16 gallons
Cooling	radiator
Height above deck	48½"
Width	36½"
Weight (dry)	2780 lbs.



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Gulf Coast Diesel News

By Michael T. Pate

JOE Grasso & Son, Inc., of Galveston, Texas, have purchased from Houston Engine & Pump Company a Gray marine diesel, model 6-D427, developing 100 hp., continuous rating, at 2200 rpm. The Gray will drive through a 3:1 Joes reducing gear to power a new shrimp boat for the company.

GULF Oil Company, Export Division, has bought through Stewart & Stevenson Services, Inc., a General Motors model 71 diesel, series No. 12107, a twin-six with torque converter to power a National C-250 mud pump. The diesel is being shipped to Kuwait.

THE CITY of Texas City, Texas, has secured from Mustang Tractor & Equipment Company, Houston, a Caterpillar D-315 power unit, developing 65 hp. at 1600 rpm. The engine will be used to repower a Grad-All unit in the city's maintenance division.

DANEVANG Co-operative Gin Company, Danevang, Texas, has bought through Waukesha Sales & Service, Houston, a Waukesha diesel, model 6-WAKDSU to power a new cotton gin being built there. The engine, supercharged, will deliver 250 hp. under continuous load.

LIBERTY Fish & Oyster Company, Galveston, Texas, has bought through Stewart & Stevenson Services, Inc., a General Motors model 110, series 62200 marine diesel propulsion unit, to drive through 4 1/2:1 reduction gear the 65-foot shrimp boat *Mary C.* The work is being done on the Liberty Company's own ways.

C. L. STANLEY, Alvin, Texas has secured through Mustang Tractor & Equipment Company, Houston, a D-326 Caterpillar power unit, developing 137 hp. at 1600 rpm. The unit will power a re-lift pump in irrigation work, filling a 20-inch pump discharge line.

BREWSTER Company, Shreveport, Louisiana, has taken delivery through Waukesha Sales & Service, Houston, for the account of Zach Brooks, of three Waukesha diesels, model LRD, to furnish the main power for a new drilling rig being equipped for that company.

L. YERIGER, Victoria, Texas, has bought a Caterpillar D-311 power unit through Mustang Tractor & Equipment Company, Houston. The diesel, developing 51 hp. at 1800 rpm., is being installed on a portable irrigation unit for alfalfa.

C. H. SHERMAN, Los Fresnos, Texas, has bought through Houston Engine & Pump Company, Houston, a Murphy M-150 diesel which will be installed by Four Brothers' Boat Works, Galveston, in a new 61-foot shrimper, the *May Sherman*. Final drive will be through a 3:1 Joes reduction gear.

HERNDON Marine Products Company, Corpus Christi, Texas, has bought through Houston Engine & Pump Company, Houston, a Murphy M-125 diesel to power through a 3:1 Twin Disc gear their shrimper *Southern Spray*.

Get Surprise "Visit" From Dr. Diesel



Lee M. Hardiman, right, of Jacksonville, Florida receives his award from W. T. Crowe, general manager and E. F. Bentley, general sales manager of Detroit Diesel Engine Division. Hardiman, a three-time winner of the Award, retired from active business recently after designing and building boats and selling diesel engines to the Florida fishing industry for over 30 years.

Dr. Rudolf Diesel, who it is assumed drowned in the English Channel soon after he invented the diesel engine, made a startling "appearance" recently before a group of top-notch diesel engine salesmen assembled in Detroit. The occasion was a banquet given by the Detroit Diesel Engine Division of General Motors honoring the latest winners of the annual W. T. Crowe Merit Award. The men, representing Detroit Diesel distributors and their dealers, throughout the country, were leaders in their respective sales zones in the sale of GM Detroit Diesel engines.



A dramatic scene in Burpee's skit was the return of Dr. Diesel to Davy Jones' locker after his one-day "review" of diesel engine installations. King Neptune, Davy Jones and the Doctor were portrayed by men in Detroit Diesel's Sales Promotion Department.

Dr. Diesel's brief emergence from Davy Jones' locker was a bit of "business" planned by R. L. Burpee, the Division's sales promotion manager. According to Burpee's script the famed inventor had received permission from King Neptune to make a one-day visit above the sea. He wanted to see how the engine bearing his name was progressing in the world. The doctor seemed slightly bewildered by the large number of diesel applications he had apparently "seen" during the day, but evidently they had made him very happy. He paid high tribute to the group as representatives of the diesel industry which had carried his invention to great heights. Then, satisfied that the continuing promotion of his engine was in good hands, he was content to slip back into the sea as mysteriously as he had appeared.

After the mysterious visit was over, W. T. Crowe, general manager and E. F. Bentley, general sales manager of Detroit Diesel, presented the group with their awards of merit and rings suitably jewelled and engraved for the occasion. The banquet in a Detroit hotel, followed a three-day Great Lakes cruise with L. A. Steele, industrial sales manager; R. W. Phillips, marine sales manager and Don Clymer, of the sales promotion department, acting as hosts for the Division.

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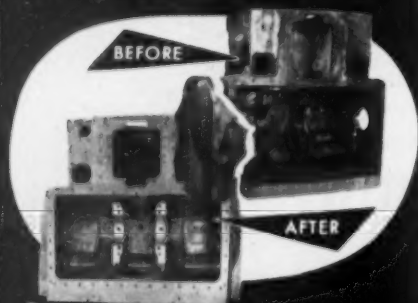


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FROM
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Inland River Reports

By David I. Day

THE Triad Equipment Co., Kansas City, Mo., has in regular use now its new towboat *Triad*, 66 x 20 x 7. The boat is from St. Louis Shipbuilding & Steel yards in St. Louis and is powered by twin Caterpillars, totaling 540 hp.

FROM Mrs. Verna Griffin, New Orleans, this column has received some neat color photos showing the diesel hawser tug *Stemwinder* approaching the Republic Terminal at Greenville, Miss., with two barges of oil, the engine room in charge of J. T. Gunnels and E. L. Pierson. This is manifestly a neat looking tug. It has a 650 hp. diesel engine, General Motors.

WE VISITED the grand opening of the \$11,000,000 plant of the Green River Steel Company at Owensboro, Ky., recently. It is believed that this plant will furnish tonnage in large amounts for the river boats. On this same trip we had the pleasure of seeing the fast *Invader* of the Industrial Marine Service, Memphis. She is using twin Fairbanks-Morse engines, 2000 hp. and Ed West, the chief engineer, had the pusher moving at a record-breaking clip up the Ohio. The boat's run is from Texas City, Tex., to Hays, Pa., towing gasoline.

THE *DeSoto*, of the fleet of the Commercial Petroleum & Transport, Houston, Tex., was also observed pushing a tow of sulphur. The boat was near Gallipolis on the upper Ohio. This boat came out new from St. Louis Ship in 1951.

THE STURDY old *Jefferson* of the American Barge Line is evidently still one of the wheelhorses of that great river fleet. We noticed the ease with

which this 170-ft. towboat handled a heavy 15-barge tow, mostly steel, some acid, and some coke—a real tribute to that 2000 hp. Cooper-Bessemer engine room.

ON THE upper Mississippi, the diesel towboats are beating all past transportation records. However, one piece of bad news came—fire on a barge in charge of the *LaCrosse Socony*, 3200 hp., General Motors, spread to the Socony terminal at LaCrosse, Wis., completely destroying it.

THANKS TO Lewis Morris, Chicago, for a picture of the Central Barge Line's addition to the Mississippi Barge Line merger, the good boat *Calumet* with some line drawings of the other CBL boats made prior to the merger. The *Calumet* was shown pushing a big tow of coal for the Commonwealth Edison Co., Chicago. The *Calumet* has an Atlas 850 hp. engine.

DESCRIBED as the "good oil boat" the *Lone Star* of the CP&T fleet, Houston, by an oldtime steamboat captain of New Orleans, has a rare engine room, a 900 hp. GM diesel engine. She is at this writing pushing a tow above Greenville, Miss., with Herbert Alamo and N. Savoie, engineers.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



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Heads Pittsburgh Office



Robert M. Pearson

The National Supply Co. has opened an office in the Grant Building, Pittsburgh, as headquarters for all sales of Superior and Atlas diesel engines for the country's inland waterways system, F. Howard Kilberry, general manager of the company's Engine Division, has announced. This office will be headed by Robert M. Pearson, who has been appointed manager, Inland Marine Sales. Mr. Pearson has long been identified with diesel engine sales on the inland rivers. During 17 years with The National Supply Co., the past 10 years as manager of sales at the Springfield, Ohio, plant, he has developed a wide acquaintance with people actively engaged in moving the nation's great volume of river freight. Prior to his connection with National Supply, he had been active in sales for several other prominent diesel manufacturers. Mr. Pearson's early career was in Pittsburgh, where he served heavy industry in an engineering capacity. He is a member of American Society of Mechanical Engineers, American Society of Naval Engineers, and Society of Naval Architects and Marine Engineers.

GM Dieselized Crane



This new Lima crane, recently acquired by the Phelps-Drake Company, Inc., of Minneapolis, is shown on one of its first assignments—a sanitary sewer job near Richfield, a suburb of Minneapolis. The new unit is powered by a General Motors six-cylinder diesel engine with GM torque converter.

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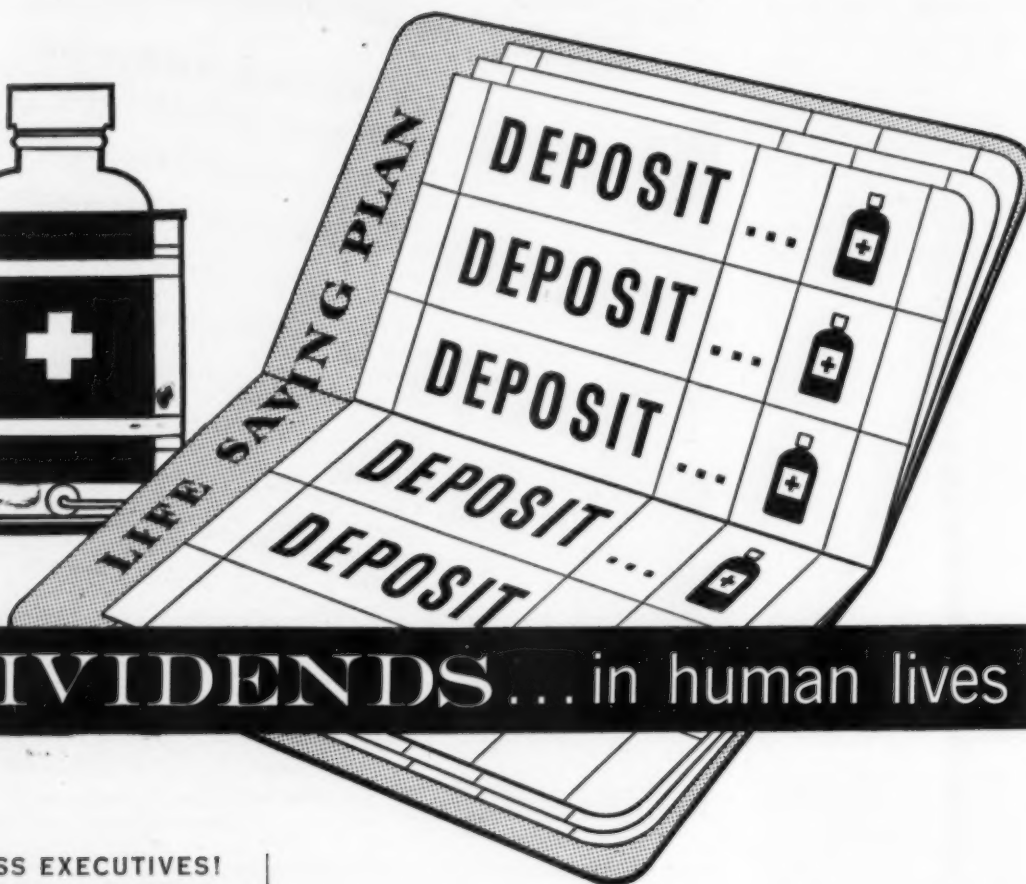
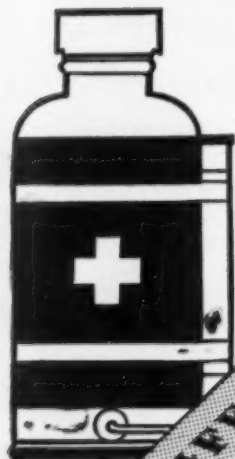
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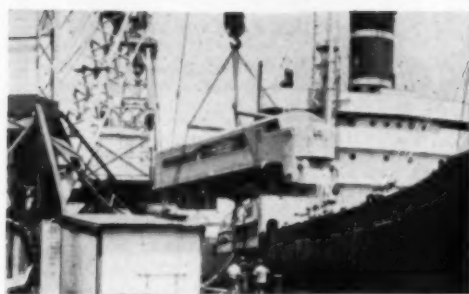
It may be a soldier shot down in battle, suffering from **shock**. Or someone here at home, sick and in dire need of new blood to restore life. A mother in childbirth, or a child in an accident.

America must give. America is **you**. Won't you call your Red Cross, Armed Forces or Community Blood Donor Center right now, for an appointment?

GIVE BLOOD

...give it again and again

Headed for Argentina



Initial shipment of a \$15 million order for 50 diesel-electric locomotives and spare parts being loaded at Philadelphia for delivery to the Argentine Government Railways. The locomotives, each one weighing 230,000 pounds and designed to deliver a starting tractive effort of about 57,500 pounds at 25% adhesion, are Baldwin-Westinghouse units. They are of the 0-6-6-0 type built for a track gage of 5½ feet. All six axles are motorized. Argentina has been a valued customer of Baldwin for the past 84 years. The first Baldwin locomotive to go into service in that country was built in 1869 for the Western Railway of Buenos Aires. Since then, more than 500 Baldwin locomotives—steam, electric and diesel-electric—have served the railroads of the Argentina Republic.

An interesting sidelight in the long Argentine-Baldwin association is the locomotive built in 1922 for the presidential inauguration train of Dr. Marcelo T. de Alvear. All fittings were nickel plated and highly polished, and the locomotive was shipped fully assembled. It was the most handsomely finished locomotive ever turned out, and the first to be shipped from a U. S. port ready for service.

Frontier Industries Appoints Ad Director

President Ralph F. Peo announces the appointment of William B. Tanner as director of advertising for Frontier Industries, Inc. Mr. Peo, in his statement, said, "Although Mr. Tanner will make his headquarters at the Manzel Division of the company, he will also handle the advertising for the Fairmount subsidiary which is located in Cleveland, Ohio. The Manzel Division manufactures a complete line of force feed lubricating equipment and chemical feeders, as well as a complete line of automotive service tools, automotive and shop equipment and farming implements. The Fairmount Tool & Forging, Inc., a wholly-owned subsidiary, is one of the largest producers of automotive body bumping tools in the world, and also has a very complete line of socket wrench kits and drop forging specialties, and has recently set up facilities for custom forging."

Flexible Metal Hose Bulletin

Bulletin No. 15-D on flexible metal hose has been issued by the Atlantic Metal Hose Co., Inc., 123 West 64th St., New York 23. It contains illustrations of the company's line of high pressure interlocking bronze and steel flexible hose, tar and asphalt hose, loading and unloading, and necessary couplings.

The bulletin lists all current applications and provides full test and engineering data. David M. Fuchs, sales manager, states Bulletin 15-D was designed to enable product designers, plant engineering and maintenance men, and purchasing agents to quickly secure full information on the flexible metal hose best suited to their applications. A pilot issue of this bulletin was sent to a selected panel of engineers for their comments and criticisms. The final form of Bulletin 15-D is the result of their recommendations. Copies of Bulletin 15-D may be secured by writing to Mr. Fuchs at the company.

National Supply Appointments



J. D. Stewart

Walter E. Garrard

J. D. (Denny) Stewart has been appointed branch manager for the Engine Division of The National Supply Co., with headquarters in Casper, Wyoming. His territory will include Montana, Idaho, Colorado and Utah, as well as Wyoming. Walter E. Garrard was appointed to succeed Mr. Stewart as oil field engineer for the Northwest Division. He will also have headquarters in Casper. Both men joined the Engine Division in 1942. Mr. Stewart has served as field engineer for the company's Northwest and Canadian Divisions since 1948, and prior to that time had considerable experience at the Engine Division in Springfield, Ohio. During World War II he was on loan to the Coast Guard as an engine specialist. Mr. Garrard worked on the test floor for engines at the Springfield plant prior to his promotion.

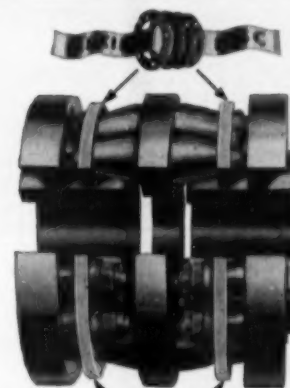
Peter Lambertus Dies

Peter Lambertus, President of the American Bearing Company of Indianapolis, passed away August 8th and the Industry loses one of its most colorful characters. Pete Lambertus was in the Diesel Industry for almost its entire length and has been making bearings for us for a great many years. As your editor remembers it, he was the first man to produce centrifugally cast bearings in the good old days, and then he came along with Satco metal which was a big advance in its time. Over the years American Bearing Corporation has been a very important unit of our business, supplying bearings to a very large number of our engine manufacturers. Not only was Pete well known to the Industry, especially amongst the engine people, but he was particularly close to your editor and we join in extending our condolences to his family. His sons Frank and Harold are currently active in the operation of American Bearing Corporation and we understand that they are going to carry along as they have been doing in the more recent past.

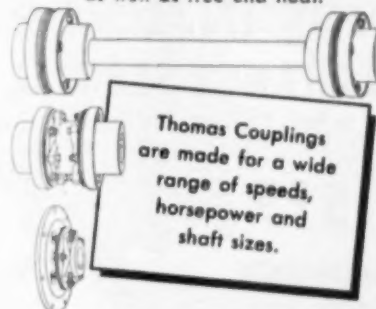
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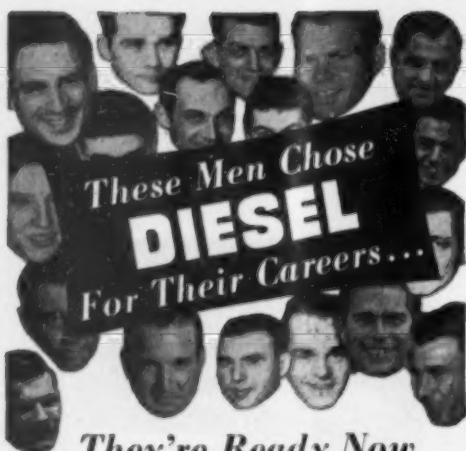
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West Coast Diesel News

By Fred M. Burt

INSTALLED IN John DiMeglio's *Belle Marie* by Crofton Diesel Engine Co., San Pedro, a 3-cyl., 68-hp., General Motors diesel engine with GM hydraulic gear and front power take-off.

TODD W. SMITH has joined The Cooper-Bessemer Corp., branch at Seattle (C. R. Jones, Branch Mgr.) as sales and engineering representative; previous experience at the main plant, Mount Vernon, Ohio.

FOR Tide Water Associated Oil Co. for use on drilling rigs in the Ventura (Calif.) field, eight new 465-hp. Waukesha natural gas engines.

WILMOT SANDHAM, formerly automotive engineer for General Petroleum is now Southwest Regional Manager at Cummins Engine Co., office in Los Angeles. J. D. "Bud" Jung, previously Asst. Regional Mgr. for Cummins in Cleveland, transferred to Los Angeles in similar position.

RECENTLY delivered for use at various points on Southern Pacific System, several of the Alco-General Electric, 1600-hp., branch line freight, diesel-electric units; upwards of 35 of the units have been ordered.

SUPPLIED by Crofton Diesel Engine Co., San Pedro, for *Western Sky* 60-kw. GM diesel-generating set with 140-hp. engine; for *Western Queen*, a 92-hp. GM diesel on 40-kw. set; Delco generators.

FOR Western Truck Lines, Los Angeles, six new Sterling trucks powered with 200-hp. Cummins diesel engines, serviced by Cummins Service & Sales Co., Los Angeles.

INSTALLED IN a 47-ft. wood seiner constructed by Estilleros Sauzel, S.A. for Pesquera del Pacifico, Ensenada, Mexico, a 4-cyl., 82-hp. Caterpillar diesel with 3:1 Twin Disc reverse and reduction gears from Shepherd Diesel Marine, San Diego.

TWO 1760-hp. natural gas engine powered Clark compressors being installed at Blythe, with three more ordered, by Southern California Gas Co., will be used to raise the gas flow in the 30-in. pipeline (to the Los Angeles area) to about 710,000,000 cu. ft. daily.

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RECENTLY re-powered with a 138-hp. P & H diesel engine from Parker Diesel Eng'g. Co., Oakland, was the 61 ft. combination boat *North Head*, recently purchased by Frank Spenger, Berkeley; a new Petter diesel auxiliary powers the 32 volt generating set.

NEW WAUKESHA distributor for Northern California is Waukesha Pacific Equipment Co., Emeryville, Calif., starting with a new building and complete sales and service facilities; Carroll Reeves, president; Dick Kilpatrick, service parts manager; Eddie Poole, field engineer; Geo. Lewellyn, field salesman.

FROM Shepherd Tractor & Equipment Co., Los Angeles for General Petroleum, two 75-kw. diesel-electric sets (with 102-hp. Caterpillar diesel engines) for power on drilling rigs.

FOR FERRY boat operation between Santa Rosalia and Guaymas, Baja, Calif., a 65-hp. heavy duty Atlas marine engine sold to Rigoberto E. Garayzar.

ON General Petroleum Oil Co. drilling rig, Lost Hills (Calif.) field, new General Motors twin diesel, 300-hp. uses Vapor Phase system for cooling with even heat under full load hottest day, thermal circulation only.

ALASKA limit seiner (5 ft. 7 in. long) *Sierra Madre*, built by Prothero in Seattle for Nick Vojkovich, has 260-hp. Enterprise propulsion diesel with Western Gear 2:1 reverse and reduction gear; single cylinder Hallett diesel auxiliary hooked to 1,000 watt Onan generator and I-R compressor.

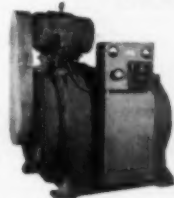
TO SUPPLY lights and power for Ben Knox' Ashmeadow Lodge (Death Valley Jct.) a diesel-electric set, 4-cyl., 80-hp. P & H engine driving 30-kw. Palmer generator, Engine Sales & Service, Los Angeles.

IN EUREKA, Calif., operated by Bill Sinn and Otis Berners, the new B & S Supply Co. will supply complete sales and service facilities on Waukesha engines to the "Redwood Empire" area.

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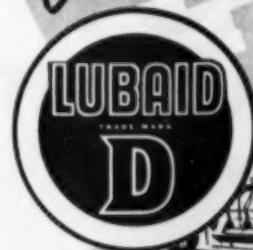
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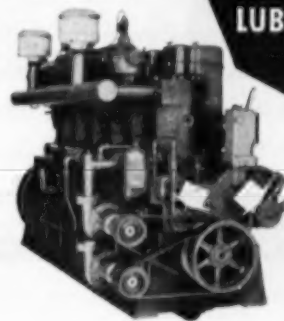


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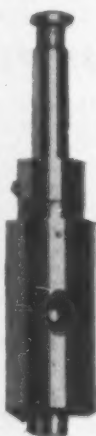
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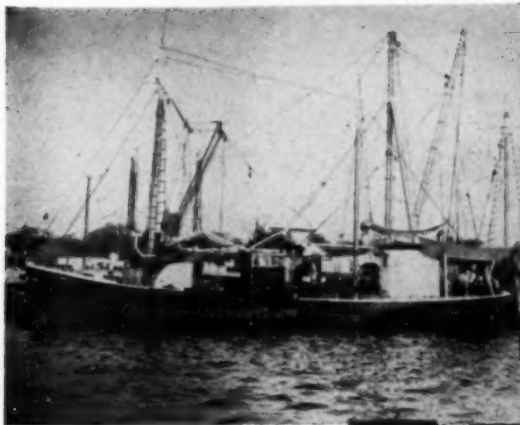
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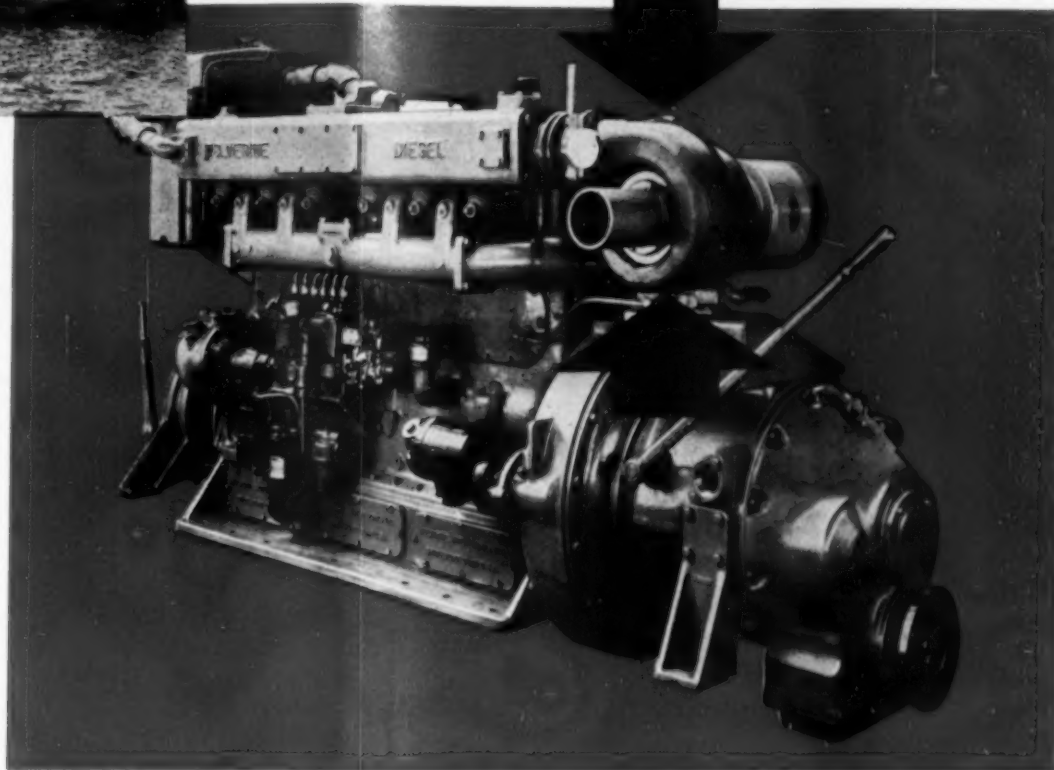
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Fishing vessels profit by the use of turbocharged diesels.

Note the small added space required by the turbocharger on this Wolverine Engine.



The new **M5 ELLIOTT TURBOCHARGER**

ADVANTAGES

Engine output increased 50% and more
Increased capacity for overloads
Saving in fuel and lube oil
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For several years the larger four-cycle diesels have been enabled to gain up to and beyond 50% of rating with Elliott turbochargers, without increase in weight or bulk. With the new Elliott M5 turbocharger, small high-speed engines as used in fishing boats, locomotives, stationary plants and mobile equipment can now enjoy the same big advantage.

This means more cargo space, more pay load, greater fuel economy. In short, savings which are even more important in the case of the smaller engines, where space is a vital factor.

For the full story on this new diesel development, contact your nearest Elliott representative or write Elliott Company, Supercharger Department, Jeannette, Pa.

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*Another Example
of
Efficient Power
at Lower Cost*



Cooper-Bessemer powered "ALRITA" *does BETTER THAN ALRIGHT!*



"Alrita", 70-foot bait boat, skippered by Lars Jangaard, jointly owned by Sverre and Lars Jangaard, and built by the Prothero Boat Company, Seattle.

RECENTLY the 70-foot "Alrita" hit the headlines with the biggest tuna load delivered in Astoria, Oregon, in 2 years — a 27-ton catch. Not quite a record, because in 1950 a 49-ton catch came in — likewise the work of the "Alrita"!

Maybe the "Alrita's" modern Cooper-Bessemer diesel doesn't have a thing to do with it. Maybe it does. We do know that for years Cooper-Bessemer

powered boats up and down both coasts have been setting enviable records of performance . . . and profits!

That's why it will pay you to get *all* the facts on the latest money-saving Cooper-Bessemers.

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